Volume XVIII.
Number 5.

MAY, 1900.

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TEXTILE WORLD,

and Industrial Record.

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1900 DIRECTORY.

The Textile World's Official Directory of the Textile Mills for 1900 (400 pp. with maps, etc.) will be published in June. It has been completely revised. Several new map plates have been engraved for it. Hundreds of New Mills have been added and thousands of changes have been made. The delivery to those entitled to receive it takes some time, but every paid-in-advance subscriber will receive a copy in due course.

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CLASSIFIED INDEX FOR BUYERS - - Page 891

GUILD & LORD,
PUBLISHERS.

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BOSTON, MASS.

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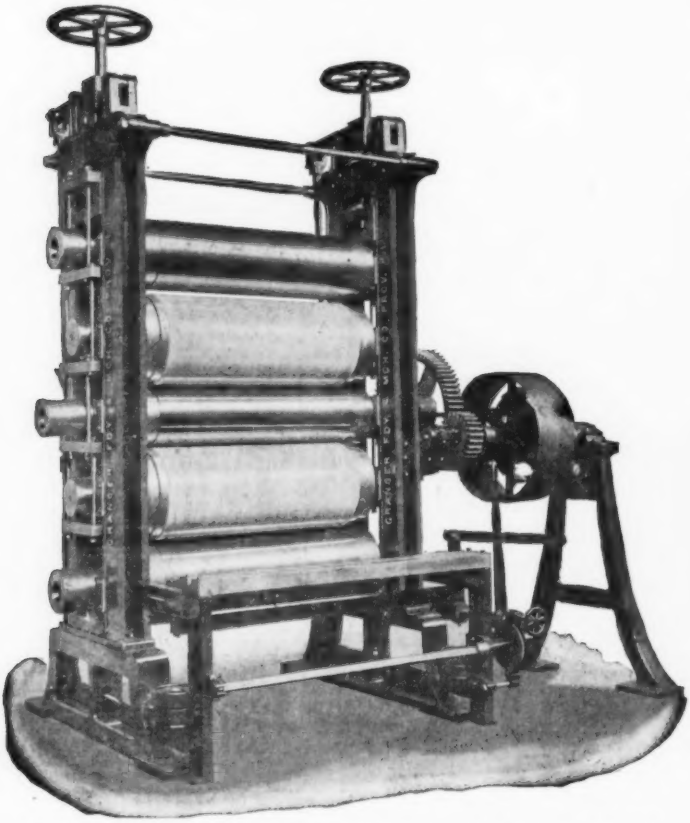
And Finishing Machinery.



CALENDERS, MANGLES AND ROLLS.

TENTERING MACHINES,
MERCERIZING MACHINES.

Granger Foundry and Machine Co.

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MACHINERY,

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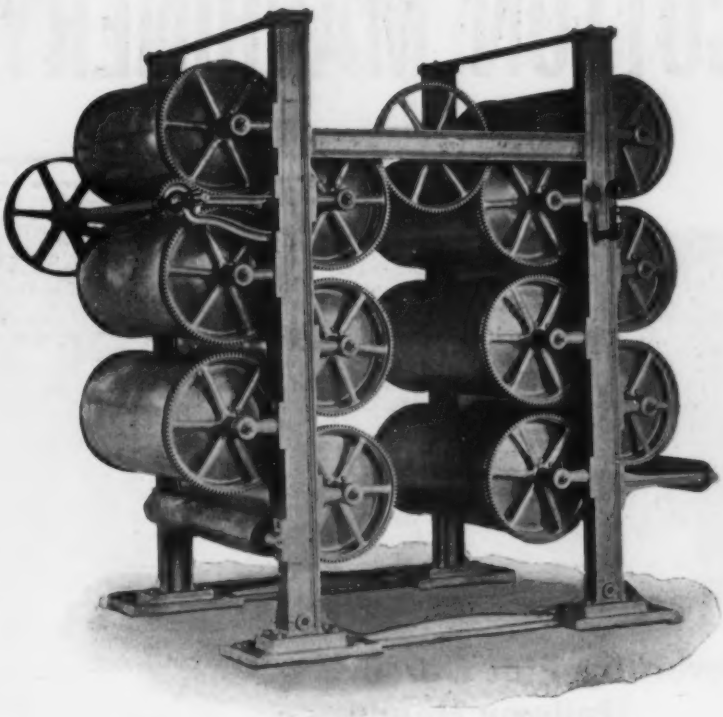

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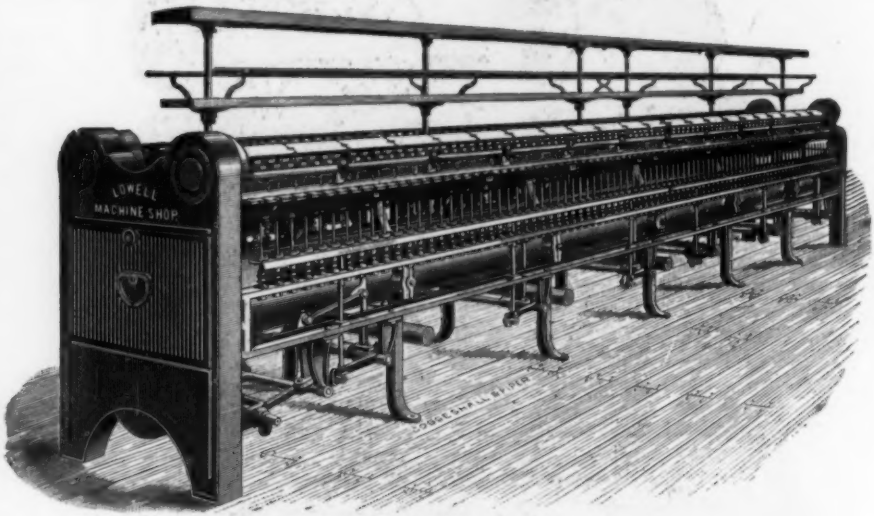
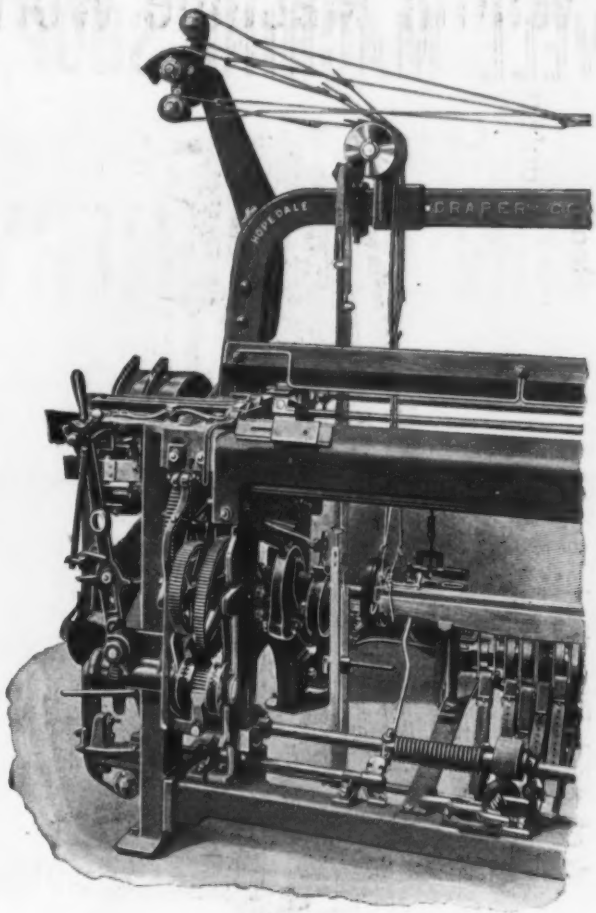


Revolving Flat Cards,
Railway Heads,
Drawing Frames,
Roving Frames,
Ring Spinning Frames,
Twisters, Spoolers,
Warpers, Slashers,
Looms.

WORSTED MACHINERY.



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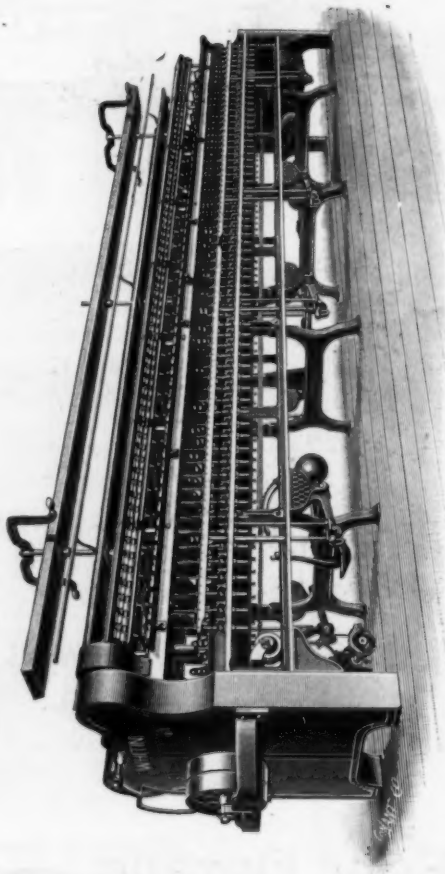

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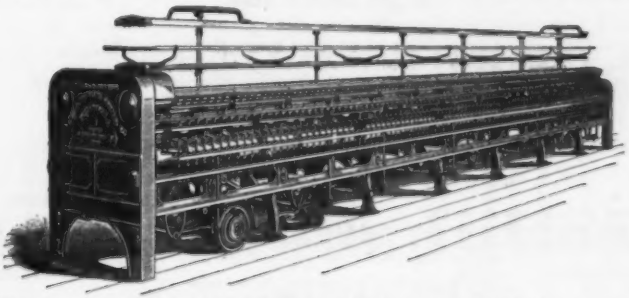

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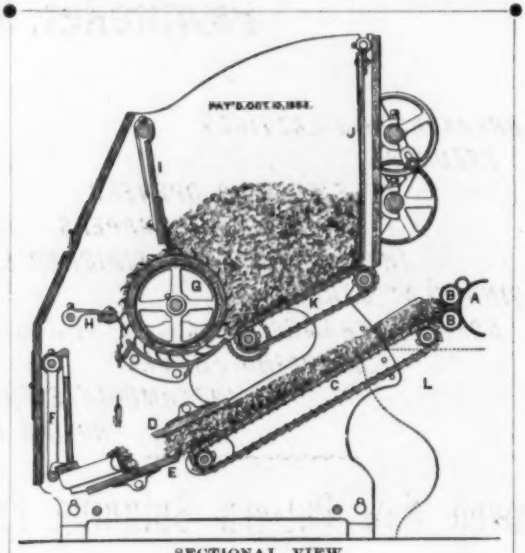
EDWIN FARNELL, Agent.



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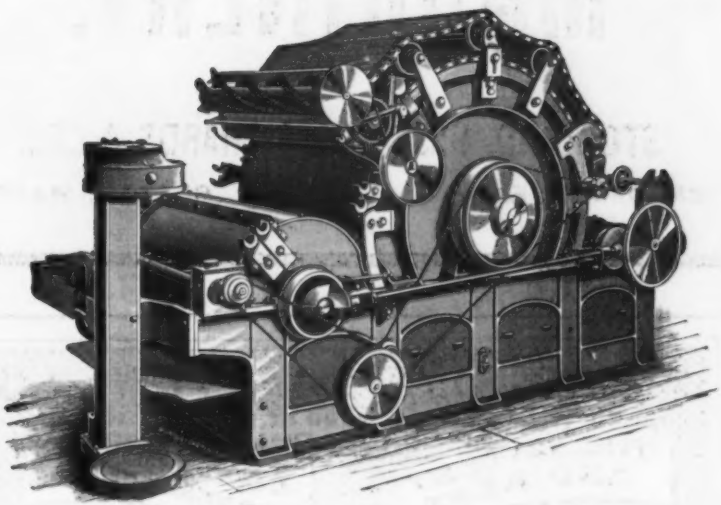

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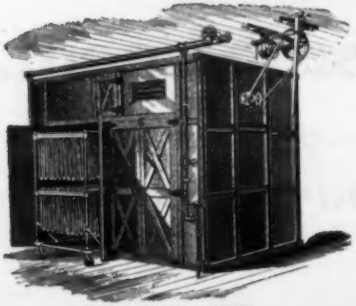

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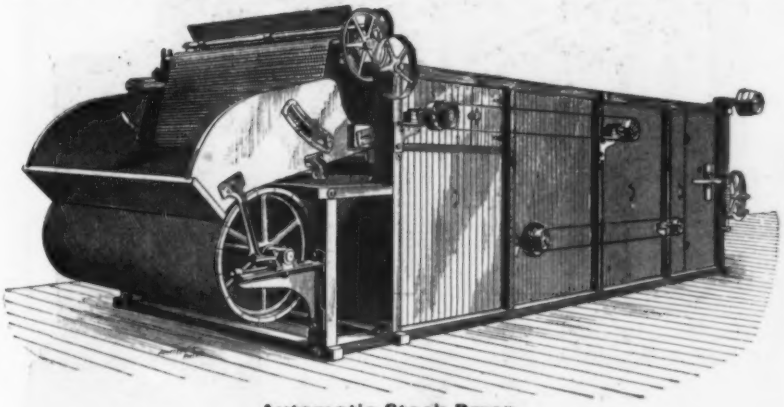

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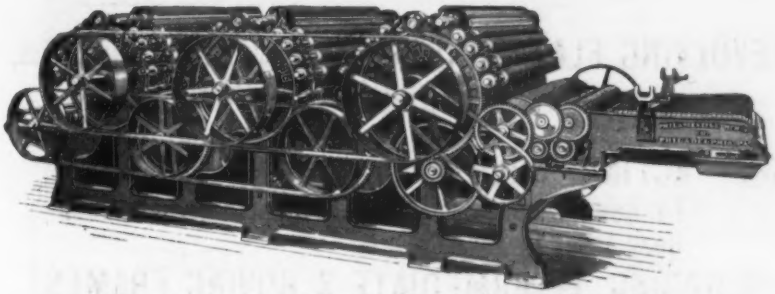

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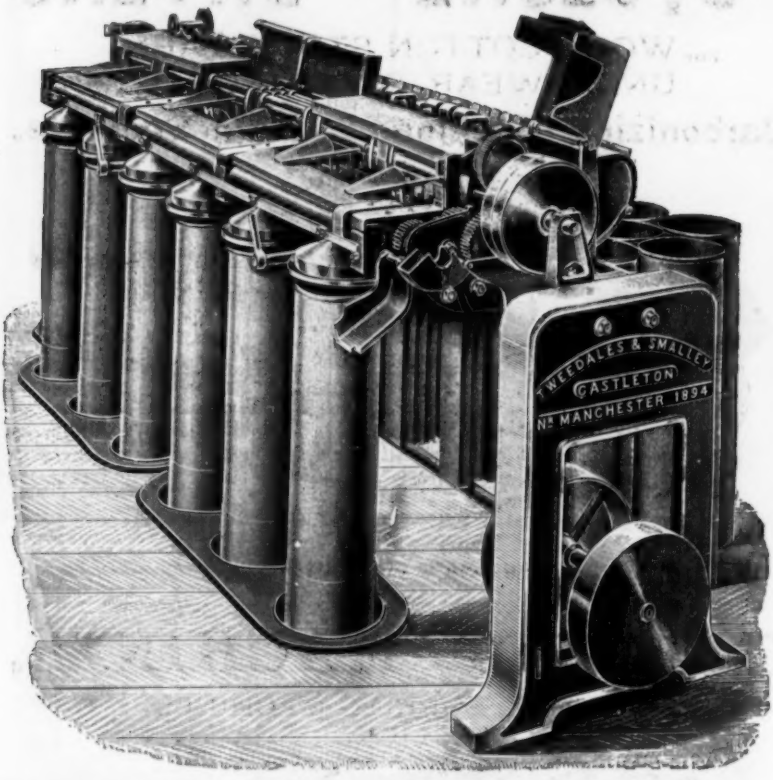

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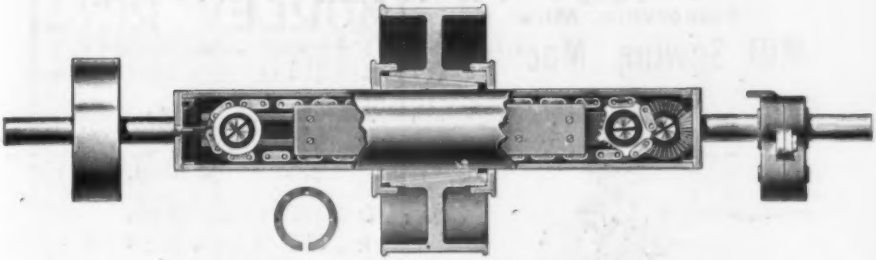

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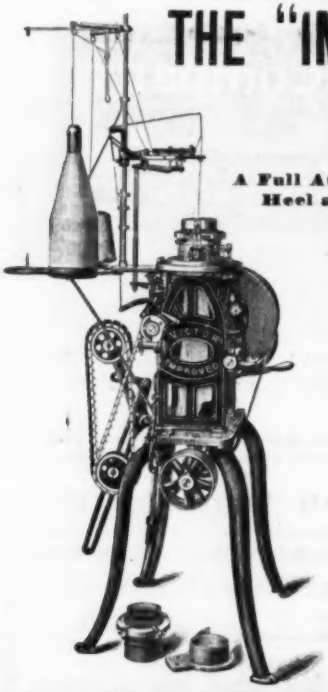

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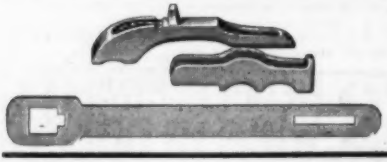

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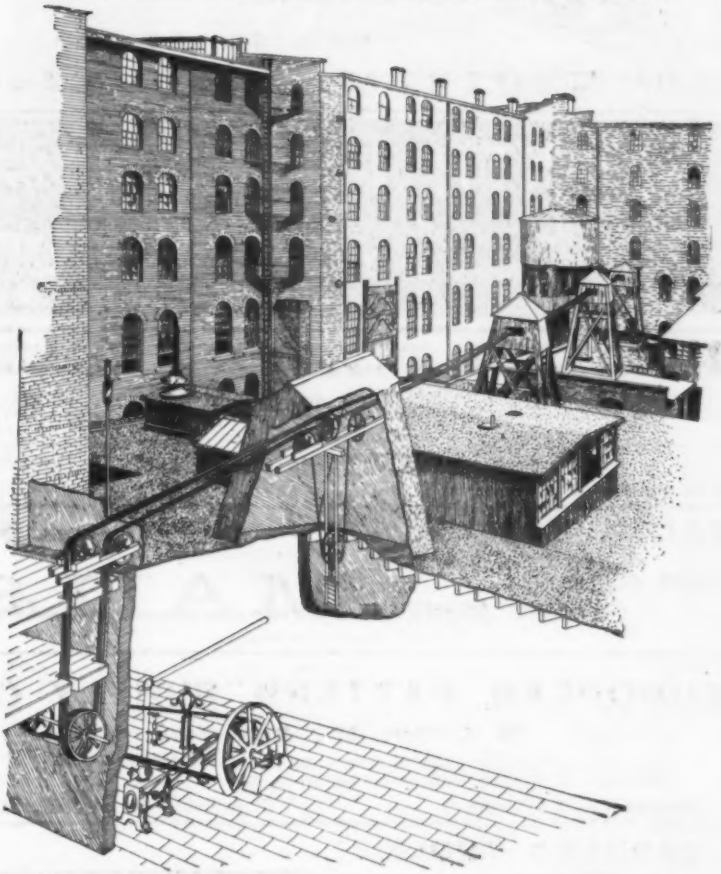

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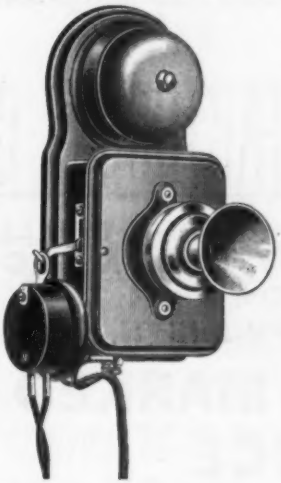

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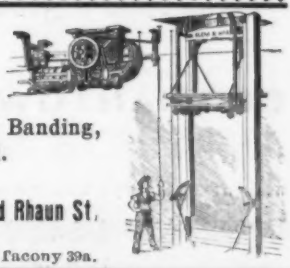

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List of Textile Patents.

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Baling Press. 646,520. Peter K. Dederick, Londonville, N. Y.

Bale of Cotton or Fibrous Material. 646,521. Peter K. Dederick, Londonville, N. Y.

Bobbin Holder. 646,625. Thos. J. Murdock, Woonsocket, R. I.

Braiding Machine. 647,410. J. H. Janeway, Jr., and C. G. Roebling, Jr., Trenton, N. J., assignors to the Woven Steel Hose and Cable Co., same place.

Carding Engines, Grinding Mechanism for Revolving Flats of. 647,823. Jos. Fossel, Boston, Mass.

Cloth Shearing Machine, Adjusting Device for. 647,439. Adna Brown, Springfield, Vt., assignor to the Parks & Woolson Machine Co., same place.

Cotton Gins, Feed Mechanism for Roller. 646,954. H. C. Chauncey, Jasper, Fla.

Cotton Condenser and Feeder. 647,516. Richard R. Pace, Lisbon, Pa.

Cotton Picker. 647,818. Wm. J. Dyer, Shreveport, La.

Cotton Picker. 647,655. Alfred B. Floyd, Helena, Ark.

Cotton Plants, Machine for Thinning Out and Cultivating. 646,977. R. J. Gatling, New York City.

Cotton Press. 647,712. E. M. Werkheiser, Arcadia, La., assignor of one-half to L. F. Wakeman, same place.

Duster, Wool. 647,042. F. G. Stewart, Chicago, Ill.

Dyeing, Process of. 647,268. Friedrich Just, Hochst-on-the-Main, Germany, assignor to the Farbwerke, vormals, Meister, Lucius & Bruning, same place.

Fabric-Renovating Compound. 647,684. Herman Stern, Cleveland, Ohio.

Fibre Cleaning Machine. 646,817. Faustino Escalante, Merida, Mexico.

Knit or other Fabric, Machine for Producing Polka Dots on. 647,162. H. H. Skevington and Wm. L. Whitehead, Philadelphia, Pa., and H. H. Hawthorne, Wilmington, Del.

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Knitting Machine. 646,474. Bernard T. Steber, Utica, N. Y.

Knitting Machine. 647,880. Max Saldin, New York City, assignor, by mesne assignments, to himself and Henry Reichenbach, same place.

Knitting Machine. 647,881. R. W. Scott and Harry Swinglehurst, Jr., Philadelphia, assignors to said Scott, same place, and Louis N. D. Williams, Ashbourne, Pa.

Knitting Machine, Circular. 648,347. James Wardall, Nottingham, England, assignor to Chas. Martin, same place.

Knitting Machinery. 646,875. Gustaf A. Schneebeli, Nazareth, and H. S. Townsend, Philadelphia, Pa.

Knitting Machines, Splicing Attachment for. 647,349. Frank Wilcomb, Norristown, Pa., assignor to the McMichael & Wildman Mfg. Co., same place.

Knitting Machines, Splicing Mechanism for. 647,350. F. B. Wildman, Norristown, Pa., assignor to the McMichael & Wildman Mfg. Co., same place.

Loom. 646,903, 646,904 and 646,905. H. I. Harriman, New York City.

Loom. 648,184. Horace Wyman, Worcester, Mass., assignor to the Crompton & Knowles Loom Works, same place.

Loom. 646,865 and 646,866. Jonas Northrop, Hopedale, Mass., assignor to the Draper Co., same place and Portland, Me.

Loom for Weaving Narrow Fabrics. 647,854. David J. MacDonald, Dundee, Scotland.

Looms, Let-off Mechanism for. 647,815. W. F. Draper and C. F. Roper, Hopedale, Mass., assignor to the Draper Co., same place and Portland, Me.

Looms, Picker Strap for. 648,150. Napoleon Lemaire, Taunton, Mass.

Loom, Ribbon. 647,957. Otto Frowein, Barmen, Germany, assignor to Alb. & E. Henkels, Langerfeld, Germany.

Looms, Take-up Mechanism for. 646,614. Horace Wyman, Worcester, Mass., assignor to the Crompton & Knowles Loom Works, same place.

Looms, Warp Stop-Motion for. 646,729 and 646,812. J. F. Dustin, Fitchburg, Mass., assignor to himself and the Parkhill Mfg. Co., same place.

Looms, Sweep Strap for. 648,136. C. F. Thompson, Oswego Falls, N. Y.

Loom-Shuttle. 647,073. Jacob Buser, Sesto San Giovanni, Italy, assignor to the firm of Siegmund Strauss, Jr., Frankfort O. M., Germany, and Milan, Italy.

Loom, Swivel. 647,229. G. F. Hutchins, Worcester, Mass., assignor to the Crompton & Knowles Loom Works, same place.

Looms, Transferrer for Filling Changing. 647,918. W. F. Draper, Hopedale, Mass., and J. H. Northrop, Tustin, Cal., assignors to the Draper Co., Portland, Me., and Hopedale, Mass.

Machine, Cloth Measuring. 647,315. D. W. Moore, Kennett, Mo.

Machine, Cop-Winding. 648,134. Vernon Royle, Paterson, N. J.

Mercerizing Apparatus. 646,787. H. E. Aykroyd, Ilkley, England.

Mercerizing, Apparatus for. 648,115. G. W. Remsen, Wilkes Barre, Pa.

Mercerizing, Apparatus for. 648,275. J. S. Lord and G. S. Lord, Whitefield, England.

Napping Machine. 747,323. Wm. H. O'Brien, Columbiaville, N. Y.

Ring Spinning Machine. 647,656. F. M. Garcelon, Lewiston, Me.

Ring Spinning Spindle for Spinning Frames. 647,072. Magloire Brodeur, Lowell, Mass.

Roving Machine. 646,410. Malcolm Campbell, Boston, Mass.

Spinning Machines, Flier for. 648,200. John Good, New York City.

Woven Fabric. 647,335. W. T. Smith, Philadelphia, Pa.

Yarn, Mechanism for Winding. 648,143. Geo. Brown and Emil Dick, Auburn, Me.

Yarn Spinning Apparatus. 647,917. G. O. Draper, Hopedale, Mass., assignor to the Draper Co., same place and Portland, Me.

Yarns, Machinery for Spinning, Drawing, Doubling and Twisting Textile. 647,138. Theo. Holmes, Pudsey, and Jos. Kitchin and Sam'l Hargreaves, Leeds, England.

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Sizing Ingredients, Size Mixing and Sizing. By Hugh Monie, Jr., 63 pages, Illustrated.

This book is intended to be a complete practical work dealing with everything relating to the modern processes of sizing, and takes up such subjects as sizing ingredients (flours, softeners, deliquescent substances); Size preparations (Chloride of Zinc, Whitening material, Percentage of size, etc.); Fermentation; Mixing; Construction of Sizing Machine; Working of the Machine; Definition of Technical Terms; Calculation, etc. Price $1.00.

Practical Mechanics for Textile Workers. By George R. Smith, 235 pages.

This is a valuable work on mechanics, pertaining to textile factories. It is written by the assistant lecturer and demonstrator in carding and spinning, Yorkshire College, Leeds. The book deals with measurements, which all mill men should be able to take accurately; with the units and apparatus employed in estimating heat, work and power; the disturbing influences in a machine which go towards making a machine what it is; cams, levers, pulleys; gears, shafting, belts; transmission of power; hydraulics; boilers, fuel, motive power, etc. Price $2.50.

Cotton Spinning. By W. S. Taggart Three volumes. Price $7.50.

This work treats of the subject in an exhaustive way, from the first operations in the picking, to the last in the spinning department. The various parts of the subject have been treated in such a manner that the young student may greatly benefit himself and use it as a text-book, while the older readers will find in them much of interest, in satisfying a desire for a fuller knowledge and a more perfect grasp of the principles underlying many of the processes in much of the mechanism of cotton spinning machinery. A spinner can make no mistake in procuring this work.

The Student's Cotton Spinning, by Joseph Nasmith.

This is a standard book on spinning. It treats of mixing, opening, scutching, carding, card clothing, combing, roving, spinning, reeling, waste spinning, etc. 593 pages. Price $3.00.

Cotton Weaving and Designing, by John R. Taylor, 288 pages, fully illustrated.

This work is by a well known writer and lecturer on this subject, and treats of such topics as: Hand and Power Looms; Drop and Circular Box Looms; Dobbies; Jacquard and Leno Weaving; Terry Looms; Principles of Designing, Plain and Figured; and Textile Calculations. This work is of much value. Price $2.50.

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Cotton. By Christopher P. Brooks, 384 pages, 174 illustrations.

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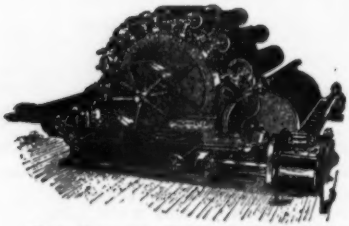

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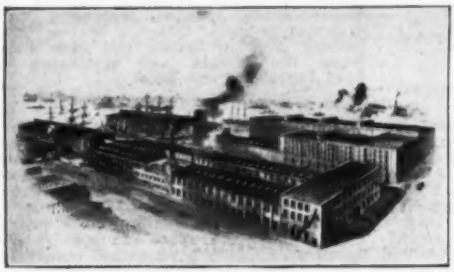

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TEXTILE WORLD.

Vol. XVIII. MAY, 1900. No. 5.

D. M. THOMPSON.

The subject of this sketch, David Moulton Thompson, is the president of the New England Cotton Manufacturers' Association. He was born at Great Falls, N. H., where his father was actively engaged in cotton manufacturing, and where the son fortunately had an excellent opportunity, early in life, to become thoroughly trained in a business for which his natural aptitudes especially fitted him, and which was to be his life work. He was thoroughly prepared for college, but the natural turn of his mind toward mechanical pursuits attracted him to the practical duties of mill work. He served an apprenticeship in each of the various departments of the mill, where he became thoroughly posted in the practical details of the business, and which experience contributed so much to the usefulness of his later years. This early service included bleaching and finishing, as well as cotton spinning. After this work in the mill, he served an apprenticeship as a carpenter and joiner, also three years' service in the Whitin Machine Works, subsequently engaging in cotton manufacturing and processes tributary thereto, which included an extensive construction of mills and various public buildings. His knowledge of building and construction, combined with his technical knowledge of textile manufacturing, naturally led toward the profession of mechanical and mill engineering, in which he engaged in 1871, building up a very large practice; indeed, the foremost of its kind in the country at that time. His commissions included some of the largest mills in all parts of this country and Canada. He visited Europe, making a study of European mill work and familiarizing himself with the best foreign methods.

In 1883, the firm of B. B. & R. Knight offered Mr. Thompson the management of their various mills, which offer he accepted. This firm is the largest manufacturer of cotton goods in the world, and Mr. Thompson brought to the management of the mills a thorough knowledge of the business and a mastery of details. After a very successful service here, of twelve years, he accepted the presidency of the Corliss Steam Engine Company, Providence, R. I. The first of last January, he returned to his former position, with Messrs. B. B. & R. Knight, where now, in the prime of a varied and energetic career in which he has acted as a leader and a pioneer in many branches, contributing to the advancement of American textile interests, he has general management of the many mills of this firm.

In addition to a knowledge of processes and mechanical operations of the mill, his experience and judgment have made him a very shrewd buyer of materials and supplies.

Mr. Thompson has always been a public spirited man among his fellow-citizens, and has taken great interest in the public improvements in the city of Providence, especially in connection with the enlargement and broadening of the streets. He is a man of broad intellectual scope, which has reached out into a wide variety of subjects, all of which have been treated in a most thorough manner. Mr. Thompson has been a member of the New England Cotton Manufacturers' Association for fifteen years, and on the death of President Clarke before the completion of his term, he was appointed to fill the vacancy, where he has served in a very acceptable manner, and at the last meeting he was unanimously elected to the office of president for the ensuing term.

NEW ENGLAND COTTON MANUFACTURERS' ASSOCIATION.

Annual Meeting, Boston, Mass., April 25, 26, 1900.

The New England Cotton Manufacturers' Association held its annual meeting, No. 68, in Chipman Hall, Tremont Temple, Boston, April 25-26, with a large attendance of members, some of whom were drawn to this meeting on account of the concurrent convention of the National Association of Manufacturers, of which body they are also members. The meeting was called promptly on time, at 11 a. m., Wednesday morning, with President D. M. Thompson in the chair. The chair appointed a committee to bring in a list of officers to serve the association for the coming year. The list that was afterwards brought in by the committee was approved by the members, and the persons named were elected as noted below. His Honor, Thomas N. Hart, Mayor of the City of Boston, was introduced, and extended the welcome of the municipality to the association. After this, President Thompson delivered his address, an abstract of which follows:

[Through lack of space in this issue we are obliged to defer the publication of the whole address.]

PRESIDENT THOMPSON'S ADDRESS.

The pleasure of greeting you upon this occasion, as President of your Association, elected to fill the vacancy for the unexpired term of my lamented predecessor, is tinged with a feeling of sorrow for the loss of one whom we all so much honored and esteemed.

The inventions which now appear so crude and simple, yet were such as enabled the spinning of yarns and the manufacture of fabrics by machinery. The improvements of the steam engine and the subsequent inventions which rendered its employment as a motor for the generation of power practicable, marked the entre into an era of such marvelous progress as to almost bewilder the mind in its contemplation. The genius of invention has passed the scope of ordinary knowledge, its almost infinite application to every condition and sphere of industrial activity and to every conceivable want or necessity of human life, whereby ten, a hundred, and even a thousand fold has been added to the former productions of human labor, is impossible to fully comprehend. The alarm and horror of the early times as to loss of occupations have long since ceased with the demonstrations that these marvelous facilities are steadily and surely absorbed and appropriated to the advancement of labor and its elevation to planes of greater comfort and to the acquisitions of pleasure and luxuries before unknown.

BUSINESS CONDITIONS.

The present conditions of business are such as to justify congratulations. Its activities are a welcome sight to a people who have suffered and struggled for existence through a long period of financial disaster, of such exceptional severity as to imperil vested interests and long established industries. The records of human suffering, and the wreck of fortunes; the suspension of useful occupations and the curtailment of production; the exhaustion of the resources and savings of labor, and its non-employment, are the memories of a past which we would fain forget. On the contrary, we shall for a long time remember it as a period during which vital and severe conditions, rather than theories, confronted us.

I am convinced, beyond the question of a doubt, that we are upon the threshold of a possible revolution of former business methods. I feel assured that almost within our grasp are opportunities such as but a few years since were scarcely believed

possible. The marvelous advances in many leading American industries justify the desire and early expectation of a large export of manufactured products. The facilities for American productions have advanced so rapidly as to render the acquisition of foreign markets a vital necessity. Heretofore a general feeling existed that such a condition was impossible except through a removal of tariffs, and the placing of American labor upon the level of European conditions. We have had sufficient of that experience. We believe, as never before, in the protection of American labor, and in such wise adjustment of tariff as will insure the protection of all industries so long, and to such extent, as protection may be necessary. Our present conditions have been created only through the system adopted of protection. There are many of our products which can be exported subject to proper influence that will insure not only permanent employment of present labor, but which will permit of large extension of present manufacturing plants.

There is one which I will invite you to consider at your convenience. It is the question of Northern and Southern interests engaged in the manufacture of cotton products.

The natural advantage possessed by Southern over Northern mills is by no means a menacing or a seriously disturbing factor, as it does not exceed 4 per cent. The total difference, upon the basis of equal conditions of plant, will vary from 15 to even 20 per cent. Now, it must be apparent that if the natural advantage does not exceed 4 per cent. then all other differences must be abnormal. They are due to the less cost of labor, and the larger number of hours of running time. This condition cannot long endure, and will gradually disappear with the exhaustion of labor, improving conditions of operatives and reduction of running time. It is a question of interest to both sections that the truth shall be known, because there are other interests involved, which are vital and require co-operation.

The conditions I have at first indicated as likely to obtain in the near future, are such as will justify a very much larger increase in the number of spindles and production than is generally believed. It is for the interests of all sections that the distribution of this growth shall be made upon just and equitable lines. This will give to the South the coarse goods and low grade fabrics of medium counts and to the North the high grade fabrics of medium counts and the fine yarns and fabrics. I think this indicates a reasonable condition and an equitable division.

Secretary Woodbury read his annual report, showing the association with a good financial standing and a membership of 564.

A paper was presented by E. W. Thomas on

WASTE IN COTTON MILLS.

Incident to the various matters of importance, which confront the managers of mills, is the one of the waste account. This is of utmost importance to the manufacturer in several ways.

First, the loss beyond the control of the manufacturer, due to the condition in which the cotton is delivered to mill, owing to the very negligent way it is protected by covering when compressed.

Second, the waste due to the various operations throughout the mill, and the duty imposed upon us to bring this amount down to the lowest possible percentage consistent with quantity and quality of production.

Considering the first problem, it is common knowledge and experience with us all, that no other commodity is handled, packed and delivered to northern mills in so careless and negligent manner as cotton. This, too, when it is considered that all tare must be paid for at full price of actual contents of the bales; this system has prevailed for years, and all kinds of arguments have been used to con-

vince the producer and shipper to give us better protected and better ginned cotton, and it is with extreme gratification that now a large interest has been developed by the producer, ginner and factor to give us cleaner cotton, free, so far as is possible, from sand, dirt, seed, etc., as well as bring the tare down to a minimum weight. The waste from covering, hoops, seed, dirt and dust is at the present time of considerable importance to the manufacturer, and to simply show what it means, I cite the following: In one large manufacturing concern which used in 1899, 71,708 bales of cotton,

The Gross lbs. purchased, 35,987,928 lbs., 71,708 bales.

Hoops	531,960 lbs.	= 1.48%
Sacking and ropes	915,349 lbs.	= 2.54%
Seed	1,901,276 lbs.	= 5.28%
Dust, etc.	210,056 lbs.	= .58%
	3,558,641 lbs.	9.88%

or per bale 49.62 lbs. Taking this at five cents per pound, and deducting the amount received for the sale of the waste, and the amount lost to this one concern for the year would be $167,797. The computation of the loss at any higher average price than five cents per pound can be readily computed. At five cents per pound this loss to the mill was $2.34 per bale. With reasonably clean cotton and proper covering, the projectors of the round bale system agreed to give, and have in fact accomplished a very great saving. It is to be hoped that the success thus far assured by them may still be continued, and the field fully developed by them and others, so that our loss from this account may be brought down to a minimum amount, as the present loss sustained by the manufacturers, in the North, amounts at the present day to millions of dollars. The selling price of bagging, hoops, seed and dust does not vary as the price of cotton (and today is selling at extremely low prices), and gives the manufacturer but little opportunity to recoup in part for the price he has to pay for his tare.

The general classes of waste made in the various operations throughout the mill may be classed broadly into soft and hard.

Soft Waste. Various classes of this waste are reworked in many mills, especially the card, drawing and roving wastes, the manner of working varying in different mills. Wherever a mill is manufacturing a special kind or kinds of fabrics, where card waste may be reworked by itself, either in warp or filling, or both, the problem in a measure takes care of itself; but where card strippings, say from finisher cards, are injudiciously mixed in with regular cotton, unless extreme care is used, the tendency is to produce uneven, unclean, and poor quality of yarn. The same may be said of the reworking of alley, card can, drawing and roving waste. Unless this waste is properly opened, and the whole lot of these classes of waste most judiciously mixed in the bins with raw cotton, trouble is sure to ensue. Wherever double carding is in operation, the common custom is to set apart a certain number of cards to each lap doubler, for the purpose of using on such cards picker laps made entirely of waste, thereby thoroughly mixing such waste throughout the lap as taken from the doubler, and by the time it passes through the railway head and drawing frames obtain a most even mixture; but, where single carding is in use, then the custom is as stated before—to mix in the picker room. As the honesty of the mixing at that point depends entirely upon the faithfulness of the employees in that department, it cannot always be depended upon for thoroughness, and in consequence we do not get as good results as when mixed or used on double carding systems. Not only is this true, but we find the same principle in regard to picker lap waste, made in picker and card rooms. This class of waste may become a source of trouble from putting too much of it through pickers in one lot, without thoroughly mixing with raw cotton.

That our Continental and foreign manufacturers are to be congratulated

on the strict attention they give to mixings of all kinds, I submit the following extract from a foreign paper, showing the attention paid to a class of reworked lap waste, that but few of us in this country take much heed of:

"Lap waste is the remnant or the torn ends from good laps. These are usually returned and put behind the openers with the unopened cotton. The disadvantages of this practice are not many and serious, but this mixing is not to be recommended when a large heap of the lap ends is put behind the opener without being mixed well with the other cotton. This neglect of a careless feeder produces soft places in the rovings and causes serious trouble at times by the frequent breakages it causes in the card slivers and frames. The best way for the proper use of this waste is to take it back to the mixing room after its proper weight is entered in a book. It should then be laid over whilst preparing a new mixture in one or two thin layers to ensure its proper distribution. The weight would serve as a healthy check on carelessness and neglect. The principal causes of this lap waste are the irregular working of the knocking off motions at the finisher scutchers, the bad state of the lap rods, bad piecing at the back of the card, and last but not the least important cause is the over-abundance of the stock of laps. The irregular working of the knocking off motion, besides its many other minor evils, gives irregular lengths of laps which have to be sent back in case of an excess or deficit in the weight fixed by the carder. The conical form of laps caused by irregular or reduced draught causes a good deal of waste whilst the laps are being unfolded at the cards. In some mills the lap rods are inserted after the laps are knocked off the machines. This practice causes a good deal of waste by the rod pushing away lumps or bits off the lap at the other end from the core of the lap. This not only makes an uneven finish of the laps, but the longer piece of the side that was torn off has to be taken away and thrown in the waste to make an even piecing with the new lap. The best way to avoid this mischief is to put the lap rod in the hollow lap roller of the machine before the lap is knocked off. This makes a very decent tail end of a good lap. All lap rods should be pointed at one end and not formed with blunt round edges as are to be found in some slovenly managed mills. The next check against this kind of waste lies with the persons who put in a new lap at the finish of an old one. These people without any hesitation take off a half or a quarter yard at the finish of a lap, putting it into waste, and commence piecing up a new lap. This is particularly done by a can-minder to avoid the running off of a lap which would cause waste of the card web and the sliver at the front. I do not mean to say that all laps should be strictly pieced up at the finish of the one previous to it. This would undoubtedly cause some delay, but what is wanted is to check the practice as much as possible. Lastly, the over-abundance of laps contributes also greatly towards the accumulation of this waste. By having too many spare laps you will have to let them stand long, which causes a swelling or bulging out of the lap bottom either in the blow room or card room. It is, therefore, advisable to produce laps according to requirements, keeping only a few spare ones."

My own personal opinion is this, that all lap waste ought to be worked into a lap by itself, without being mixed with raw cotton, and passed through but just enough picking machinery to even it and prepare it in lap for carding; then such laps be put on cards, and the slivers mixed in with those back of railway head or coarse drawing frames in proper proportion. I think also that all waste, which has been carded once, like the best strippings, fly, card can, drawing and roving waste, and clearer waste

should be worked entirely independent of being mixed with raw cotton. It does not seem to be a necessity to repick, or to put through carding again. Some kind of a machine with an apron and drawing rolls controlled by a sensitive evener, and a delivery on to the apron controlled in similar way that woolen cards are fed automatically (the machine to have coiler can system), the sliver produced from such machine to be taken to the back of the drawing frames can be used. My reason for this system would be to obviate the disposition, now existing in picker rooms, to not thoroughly distribute this class of waste with unworked cotton into openers; also, that there is in many mills too much card can and drawing waste sent back to picker, through carelessness of drawing frame and slubber tenders in making an over amount of can waste. Where light or heavy sliver is to be removed from can for any reason, a great many more yards are ordinarily removed than is necessary; also, that the slubber tender is too often prone to empty out of a nearly discharged can the few yards in bottom by turning it out and putting it into waste can. Whenever the percentage of this class of waste is above a certain amount, surely it cannot and will not work well when mixed with unworked cotton. It is true, however, that it is far better to have the operative remove too much sliver when single has been made than too little.

With the systems above described, the idea would be to work such cotton as was taken from the bale through without any mixing of waste stock of any nature, believing that such working would give the very best results, and as even yarn as is possible to obtain with our present imperfect system of picking and carding.

Some mills have machinery to break up broken cop filling and ring filling waste. There is some doubt in many manufacturers' minds as to whether this is economical, but others assert that it does warrant reworking rather than selling as cop waste. This is possible where it can be put into goods that do not call for especially even yarns, but it is a mistake to try to rework it in mixtures with raw cotton. It ought to be mixed with drawing and card can waste, and then worked as stated above. Oily card and clean, soft waste, either clean or dirty, may be worked up to good advantage with special machinery. Our Continental friends are specialists in this latter process, and today our very low grades of waste are imported into Germany, England and Russia, to be reworked into yarns and goods of a fairly commercial quality to demand a price far above the market price of the stock from which they are made, plus the cost of production. We, in this country, are in the background of manufacturing in regard to the proper and practical use of waste. Cotton waste as handled in the market (especially some kinds) is a drug, and commands low price; many of the uses to which it was formerly put, have been abandoned and something else substituted.

The question for any manufacturer to consider is whether under the circumstances the absolute removal of all kinds and classes of waste from his standard goods, the better quality of same to be obtained thereby, would not be of sufficient interest to have him invest in such few special machines as he would purchase to handle all his waste as a specialty, the yarns from which to be put into cones for sale, or to be worked up into other classes of goods that might be woven.

Of the waste made in mills, both soft and hard, the amount has been sensibly decreased by the improvements in machinery for the last 20 years. The substitution of the revolving top card, as compared with double carding, or even with heavy single carding, of the Foss & Pevey type, shows a very marked decrease in card waste. The use of 12-inch cans for 10-inch on cards and drawing frames, the metallic roll on drawing frames, the working of larger bobbins on the

intermediate and finer processes of roving machinery, larger bobbins on spinning and spooling, more length of yarn on warper and loom beams, ring filling for mule cops; all these have contributed each in their proportion. Much credit is due to what has been done in this line. Still we are not satisfied, and perhaps reasonably so, for, with all the improved machinery, with the best of stock, we sometimes feel that our waste account is something appalling.

We must now treat with the operative to bring the loss of waste lower, if possible. How can this be done? Presumably, in all up-to-date managed mills, certain rules are understood to be enforced, made and intended to work to the end of economy in preventing the making of waste beyond the lowest legitimate or practical point. Whether these rules, if strictly adhered to, would or would not prove efficacious depends entirely upon all the parties concerned inside the mill. It has been stated, and it is undoubtedly true, that a too rigid enforcement of rules pertaining to this subject, does not produce the result sought for. More particularly true is this where cop filling is used in weave room; also on spoolers, slashers, etc. A good, properly built cop, and a good, properly built overseer, are indispensable in a weaving plant, if a minimum amount of waste is to be found in weave rooms.

At a meeting of this association some few years since, in fact, in 1896 at the Profile House, this question was discussed by quite a number of our members; various methods were described and suggestions made. It would seem that the consensus of opinion was to the point of impressing, first, upon the employees the monetary loss to the mills of every ounce of waste made, and that the responsibility should be borne not only by the operative, but by section men, fixers, second-hands and overseers. Indeed, in this matter, superintendents and agents should be included. In point of fact too little attention is given to the subject of waste. In nine cases out of ten, the waste house is not visited often enough. Oftentimes the boiler house is made a receptacle for waste of all kinds, perhaps in no great quantities at a time, but when computed for the six months means a good deal. Oily waste and dirty sweepings start a fire in boilers as easy as most any material, so firemen say. In these times of competition, not only with our neighbor at hand, but with others in adjoining states, it is an imperative duty to produce our goods of strictly first class quality, and of watching what might be considered the smaller things about the concern. In one sense, the boiler house, banks of the canals and rivers, mouth of sewers, and waste house, are nearly as important to look out for as is the handling and inspection of cloth in the cloth room; for in these places may be found generally the waste products of the mill, not only in yarn wastes, but also wastes in supplies of various kinds. The longer we, at the North, remain in the manufacturing business, the more and more must we have in mind the most rigid methods of economy, and certainly one of the places wherein improvement can be made is the thorough handling of the waste products of the mill, and prevention of excesses.

Is there any more important subject for discussion than this? First, the prevention of excessive waste. Second, the most practical utilization of it when made.

The following paper was presented by William Whittam, Jr., on

LATIN AMERICAN TRADE IN COTTON GOODS.

Happily, at this time one cannot lay so much stress upon the immediate necessity for the expansion of trade in cotton fabrics in foreign markets owing to an apparent chronic state of stagnation in the domestic demand.

The rapidly increasing productive capacity of our southern neighbors, and the evident trend of many of their

mills to turn their attention to the finer grades of fabrics will certainly at no distant date, force our manufacturing corporations to seriously take up this matter, if a healthy condition of trade is to be maintained. It has been computed that the south will add 2,000,000 to the number of spindles now in operation, during the current year, and should this rate of increase be maintained for another year or two, the result cannot but be most prejudiced to the industry throughout the country, if our own people only, are to be relied upon as extensively as has been done in the past, to consume practically the whole output.

We have in Latin America some 65,000,000 of people, each individual being a potential customer for our products. The average total value of the imports of cotton goods by these countries is approximately $79,200,000 this being the value of the goods in the countries of origin.

Assuming that these goods, averaging gray, white, colored and printed, cost six cents per yard and that they weigh five yards to the pound; let us see how many spindles could be kept in operation if this country could secure one-half of these markets. Seventy-nine pounds per spindle per annum is given as the average production for the mills of this country. This then would require 1,450,000 spindles, or very nearly as many spindles as were in operation in the southern states ten years ago. The value of our annual sales of cotton goods in these countries during the decade ending 1898 was only $4,650,000 and this amount is only a trifle over five per cent. of their total imports of cottons. This value was about equally divided between colored and uncolored cotton cloths. In other words we sold to Latin America rather less than six per cent. of their total purchases of manufactures of cotton.

One important fact to remember is, that the bulk of the South American demand is for cheap and showy goods, and until we are not only prepared, but also willing to meet the demand we cannot hope to meet with any considerable degree of success. The practice of heavily sizing the warps, in order to cheapen the prices at which goods can be sold will doubtless have to be adopted by the coarser mills who decide to compete. The ethical side of the question of adulteration does not concern us, so long as our customers know that the fabrics are adulterated, and I assure you that they do know this, quite as well as does the producer, and so familiar are they with the subject, that any attempt to foist such goods upon them as "pure size" expecting to receive for the extra adulterants the price of good cotton, would be fatal to the future chances of securing trade of any firm who should be so foolish as to make it. It is certainly a fact that the preference is for goods having the full appearance and "clothy feel," produced by heavy sizing. The lower prices of this grade are also practically necessary to the "peon" class.

We are very much behind our competitors in many details, which might seem unimportant, but which in reality have much to do with successful competition; the marking of goods and pieces is a case in point. American goods are very generally marked in English, being consequently quite unintelligible to the consumer. Trade marks should be in Spanish, and lengths and widths expressed in the terms of the standard in common use in the country to which they are sent, the "vara" (vara=yard) being the term generally employed. In ten countries there are no less than eight standard vara measures, ranging from 32.87 inches to 34 inches. It is customary with European merchants to mark each piece with the name of the importer, and occasionally some special trade mark of the importer is placed on the goods, a small extra charge being usually made to cover the actual expense of doing the work.

Invoices must be made out in Spanish and prices, etc., also expressed in

terms of the monetary system of the country to which they are sent.

The proper packing of goods is a matter of first importance; duties are usually collected on gross weights, therefore everything possible should be done to lighten the weight of every bale, all unnecessary boards, stiff paper, binders, etc., being left out.

South America is generally very mountainous and comparatively without railroad facilities, and cart roads; interior transportation being generally done by means of donkeys over mere bridal paths through the mountains, cases being for this reason utterly impossible. Burlaps and waterproof paper are used entirely for covering, and each package should weigh about 150 pounds. Lack of proper docks, and landing by lighter through the surf is common and this in conjunction with frequent and serious delays and exposure of packages to a tropical sun and torrential rains on the wharves, and also during a lengthy journey into the interior often taking several weeks for its accomplishment makes the necessity of a perfectly waterproof bundle paramount. As in the case of special marking, so with packing, it is usual to make a small extra charge, for specially packing goods for these markets. From $1.00 to $2.00 per bale is the amount usually debited for the extra cost of packing. Bales ought to contain an assortment of patterns, so as to permit of their being sent directly to the branch establishments of the importing house, or to the retailer in the interior without reassortment.

Extended credits are the rule, six months being the average time required and given; many interior merchants, even with this time allowed them, frequently pay for their goods before they come to hand, owing to slow transportation and the frequent delays already mentioned; after all, the matter of giving extended credits is merely a question of profit, and if European merchants find the trade profitable, prices, terms and risk being taken into consideration, and fight as keenly as they do, this feature cannot surely be an insurmountable obstacle to us; we are undoubtedly badly handicapped by the entire lack of direct banking facilities, almost every dollar we exchange, having to pass through London, and in its passage a bit is chipped from it; the enormous annual tribute we thus pay to the London bankers could just as well be kept at home.

A paper prepared by M. F. Foster, was then read on

SOUTHERN MILL MANUFACTURING.

The rise and progress of cotton manufacturing in the cotton producing states has been marked by the most rapid and the greatest growth of any industry in the history of the world. The early efforts made to manufacture cotton goods in the South met with signal failure and at the commencement of the civil war the business was considered of very little importance.

The operatives before the war stayed from the mill at their pleasure and it was doubtful if on any morning a sufficient number reported for work, and to be able to keep the machinery running it became necessary to send out to the houses and upon the street to drum in recruits. The conditions brought about by the war changed that state of things. All able bodied men were conscripted and those wanted for cotton mills were detailed for that work. The instruction given was that when the men were no longer wanted for that work they should be turned over to the nearest conscript office. Most of the men employed in the cotton mill did not want to be soldiers and the fear of being enrolled into service prompted them to subject to the proper discipline and at the close of the war labor was well organized and in condition to operate the mills successfully. It was then that cotton manufacturing began to be a profitable business in the South and the few mills which survived the war

and were under good management made great dividends to the stockholders. The success of these mills stimulated the investment of capital in the business, and new mills rapidly increased in the neighborhood of those which had been the most successful. The mill operative had come out of his unpolished state by his surroundings in and out of the mill. Most manufacturing places in the South now have schools and churches supported largely by owners of the cotton mills. Libraries and places of amusement are also put within the reach of the operatives and it can be said that a considerable part of the cotton mills south have as competent and well trained operatives as can be found anywhere.

In looking upon the rise and progress of cotton manufacturing in the South we are led to believe that the coarser fabrics of cotton goods will be manufactured there, the only doubtful issue that ever presented itself having been the labor question. But that long since has ceased to be a cause of apprehension. While the question of cheap labor and longer hours for a day's work in some localities in the South gives considerable weight to the matter, yet, in fact, it does not enter much into the future prospects in favor of the Southern cotton mill. The labor element when of sufficient strength will not fail to secure for themselves all the rights and privileges which have been obtained through legislation in the New England States. It will probably be many years before the same adverse legislation will be inaugurated South that is being forced upon the manufacturers in New England, as there are other and more diversified interests that will absorb and divert their attention from the mill operative. The small farmers in the South are removing to the manufacturing places where they can better support their families. They go to the cotton mills to stay.

The necessities of life for the southern mill operative are less than for the New England mill operative, cheaper rent, fuel and provisions enter largely into the matter of living, together with the fact that the southern mill operative seldom provides for the future. His present wants are first and foremost. The scale of wages will be regulated much upon the basis of the operative's wants and the supply. The South has a climate well adapted to cotton manufacturing where nine months in the year work is conducted without artificial heat and with open doors and windows.

The finer grades of yarn will follow closely upon the coarser grades and the South will become a sharp competitor with New England in the manufacture of those goods. The mistakes that have been made in building small mills operated with limited capital will not be repeated so much in the future, but the larger and well equipped cotton mill with ample capital will become the future mill of the South. The New England manufacturer will not be slow to protect his business and will change the product of his machinery to the finer and more improved grades of goods and thus hold on to his business and realize profit to his investment.

The southern manufacturer has to learn before he becomes convinced that it is the favorable conditions that surround him that makes his business a success and not altogether in his ability as a manufacturer. As the conditions change and the margin of profits decreases, he will be led to look about him and learn to practice greater economy in conducting the details of his business. While there are many mills in the South where the best of management has been introduced, there are others that are managed in the most primitive manner by men having the control who have picked up the limited knowledge they have of the business from second and third rate men who happened from time to time to be in their employ, and in many cases been dismissed for cheaper men. There are many small mills in the South that cannot under the best man-

agement be operated successfully in comparison with the better equipped mills controlling better skilled labor. It will only be a question of time when these mills will be closed. They will not survive legislation for shorter hours of labor and other restrictions that will be forced upon them by labor demands. The quality of their product will meet with greater criticism from the dealer and consumer which will either throw their goods out of the market or result in such a mark down in price as to leave no profit to the manufacturer. The larger mills backed up by ample capital will continue to compete with the best mills in the country with continued prosperity and aid in building up the new South. The introduction of cotton manufacturing in the South has done more to improve the condition of the poorer class of white people than any other movement that has visited them.

The question of using colored operatives in southern cotton mills is yet unsolved. The white man and the negro will not work alongside. They do not affiliate and will not be together in any labor organization. Those mills that employ colored labor can work nothing else. When the supply of native white labor becomes exhausted in the South the manufacturers will not hesitate to fill their mills with colored operatives which will readily be secured at low wages and be used to advantage in the manufacture of the common grades of cotton goods. If the negro has what the white man wants and must have, the white man will be sure to get it and use it.

The Wednesday afternoon session opened with a paper by Dr. W. P. Wilson, of the Philadelphia Commercial Museum, on Export Opportunities in Manufactured Cotton, followed by a paper by J. H. Burghardt, on Belting, From Hide to Pulleys. This will appear in our next month's issue. Papers read on Lighting Buildings, by Refracted Daylight Through Luxfer Prisms, by George K. Maltby, and on Warming and Ventilation of Mills, by Prof. S. Homer Woodbridge, will appear in subsequent numbers of this magazine.

Thursday's morning session opened with an address by His Honor, John L. Bates, Lieutenant Governor of the Commonwealth of Massachusetts, followed by a paper by John B. Cudlip, on

SYSTEMS OF PAYMENT ON MULES.

The three general methods of paying mule spinners in force throughout the country are: daily wages; as much money per pound of yarn spun; and the hanks per spindle as indicated by the hank clock on the front steel roller, or the number of stretches as shown by the back shaft stretch indicator. The system of paying by the day is in quite general force, and while there are some decided drawbacks to its use, yet under favorable conditions it works about as well as a piece-work system. One trouble with the standing pay system is that in rooms where it is in force the overseer will generally find it more difficult to get the maximum production from the mules at all times, because the feeling that the pay is there whether the mules run or not is very apt to make the spinners who are a bit lazy rather slow about keeping their mules running during working hours, and when the work is spinning badly they are perhaps more liable to anchor up their mules in order to get straightened out, than to put up a fierce effort to get their work up and keep their mules going. These objections do not amount to a great deal or carry much weight in thoroughly well run rooms; more especially is this true of good hosiery yarn mills where really bad running work does not occur very often. Where there is a great deal of changing both in numbers and roving, such as there always is in a colored mill making a wide variety of goods and spinning its filling out of stock-dyed cotton, the simplest and probably the

best method of payment is to give standing wages. When piece work is in force in a room of this description it is a great deal of work and more or less difficult to keep track and make the proper allowances for all the changing.

In rooms where so much per pound is paid the most general way to get at the pounds spun by each spinner is to weigh off the work from each pair and deduct so many pounds as the average tare for the weight of each box, or by taking the actual weight of each empty box, which has been weighed and marked when new. A great objection to this system is the large amount of labor involved in doing the weighing, and the fact that it is almost impossible to keep the tare of the boxes right. In handling the boxes, and especially when they go into the steam chest, after a few weeks' or months' use you will find a good many boxes with pieces broken off, or perhaps they have been repaired by nailing a false end in, thus the boxes are lighter or heavier than their accepted weight. The spinners realize this very keenly and as a result the longer headed ones are constantly on the alert to secure good heavy boxes. While there may not be a great deal of actual loss to the mill, in fact if the boxes are light the mill gains that much, yet it is a rather dear gain for it certainly gives the spinners more or less good grounds to consider themselves a little unfairly treated in the matter. There is another side to this method of paying which is, that a mule may be changed a tooth or a number of teeth lighter or heavier on the draft pinion, and the yarn still be called the same number for convenience. When this is done it is somewhat unfair to either the mill or to the spinner. Where the change is made on the light side the spinner knows he has to run his mules so many stretches longer to get the same number of pounds; on the other hand when the change is made on the heavy side the mill is really paying more than the agreed price per pound for the spinning.

In the system of payment by the lunk clock on the front roll or the stretch indicator on the back shaft, there is no possibility of a mistake in getting the product of the mules unless the overseer puts down the figures incorrectly, and it is impossible for the spinner to beat the mill by turning his clock by hand when the mule is stopped, because the Orme indicators now have a cast iron housing attached to the clock, through which the end of the steel roller carrying the driving worm runs; from the nature of the construction of the back shaft indicator it is impossible to monkey with it and show more stretches than the mule has actually run. This feature of absolute truthfulness is an extremely valuable feature to the mill, as it insures that the mill records show only the actual work done, and that the spinners have only been paid for just what they have spun.

The paper read on Methods of Cost Finding in Cotton Mills, by Wm. G. Nichols, was an exceedingly valuable one, entitled to a fuller report than can be given to it at this time. We shall give it space in a future issue. Papers on the Application of Mechanical Draft to Stationary Boilers, by Walter B. Snow, and on The Height and Area Required for Chimney Draft, by H. G. Brinckerhoff, will also appear in subsequent issues.

The afternoon session of Thursday opened with a paper by Alfred E. Adams, on

RING SPINNING.

The gravity spindle, of some type, is in general use today. Bolsters should fit closely in the rail. Spindles set perfectly plumb. Whorls should be exact in diameter, distance from centre of whorl to centre of cylinder shaft alike for every spindle, thus making it practicable to use bands that are marked, and assuring an even tension or pull on the band, when

knots are tied on the mark, thus avoiding undue wear and saving power.

The ring rails should not be over eight feet in length, and cast so that when finished and placed on frames, they will be perfectly level on top and straight on the sides, without being peaned. Over two rods to a rail are not advisable. When three are used, the rails are more apt to dwell, causing badly filled bobbins, thus making waste. A slightly tapered hole on the under side of rail, where it rests on lifting rods, will avoid any binding or dwelling, where two rods are used, due to the frame being slightly out of level.

The best wearing rings are so tempered that they cannot be cut with a file. The flanges should gauge alike in width and thickness. Also the ribs connecting the flanges should be exactly the same thickness in every ring. The nearer to a standard these dimensions are, the smoother the traveler will run and the longer it will wear, which means less waste, and more spindles run by spinners.

A ring out of level will cause the traveler to vibrate, thus wearing the traveler and ring faster than a traveler running on a ring which is out of round. In putting rings into plate holders, the holders are frequently sprung if the rings are put in taut. Then when placed on the rails and screwed down, they are frequently found to be out of level.

Thread guides should be made of not less than No. 8 wire and screwed into thread boards as taut as possible. In new frames, the guides should not be turned in so far as when being set, it becomes necessary to draw them out, thus loosening them.

Top rolls should be uniform in size, and covered in the best possible manner, especially for high speed and fine yarns. The very best of all wool cloth not less than twenty-two ounces per yard, should be used. The skins should be carefully selected. Cots not drawn on too taut. Cushion is necessary for light weighting of rolls. The rolls will last longer, power is saved and a better quality of yarn assured. Long boss rolls are preferable for spinning yarns up to 60s or even higher. Above 30s the best results are obtained by not weighting the middle rolls, and setting the rolls as close together as the staple will admit of.

Ring rails on filling frames should traverse slow, when running down, and quick when running up. Running down slow is to avoid any extra strain on the yarn when changing direction. It also assures the use of a slightly heavier traveler, thus winding the yarn on bobbin harder, securing a greater length of yarn. Filling bobbins should never be wet, except they are enameled. Enameled bobbins do not catch and hold the thread as readily when doffing.

Spindle banding should be made from good strong staple cotton, using an 8 or 10 hank roving. Not twisted hard on fly frames.

Following Mr. Adams's paper was one by Henry I. Harriman, on

THE HARRIMAN AUTOMATIC LOOM,

of which an abstract follows.

It may safely be asserted that at the present time no subject is receiving more careful consideration than that of weaving. In its essentials the power loom has changed little since the date of its invention. It has been made heavier, the details of the let-off and the take-up and the numerous other parts have been changed in their degree of efficiency, but little in their method of operation.

The chief feature of novelty claimed for the loom which is the subject of this paper is the fact that ample time is taken for the resupplying of filling. To secure this end three methods have been adopted. The loom is brought to a complete standstill, a filled shuttle exchanged for a spent one and the loom automatically restarted; or the picking is suspended for a series of picks, the speed of the loom reduced to fifteen to twenty revolutions per minute, the shuttle changed and the

loom restarted at its normal speed; or lastly, the picking is suspended and the shuttle shifted from the stationary magazine to the moving lay, ample time being given for such operation because of the suspension of the picking.

Experience has demonstrated that the speed of all automatic looms now running must necessarily be less than the speed of the modern plain loom. It is doubtless possible in an experimental way to run a shuttle or bobbin shifting loom at a speed of 200 picks a minute, but no mill in the country has ever succeeded in doing so day in and day out, week in and week out,—yet how numerous are the cases where for years at a time whole rooms of common looms have averaged this great speed. In the case of this automatic loom it can be readily seen that there is no relation between the speed and the mechanism supplying the filling. They are entirely separate and distinct, one running only while the other is still; and as the loom must stop to change its shuttle it is clear that the change can take place as easily in one whose speed is 225 as in one running 100 picks less.

The adaptation of an automatic loom to the weaving of twill or dobby goods necessitates mechanism to prevent miss picks, and the means adopted to this end are the natural outgrowth of the method of resupplying weft. While the loom is still it is practical to bring into play many operations which would be absolutely impossible on a running loom, and advantage has been taken of this fact.

As the operations are entirely automatic the first pick of the new shuttle will enter the shed in which the previous filling was exhausted and there will thus be a partial double pick but no miss pick. By a proper adjustment of the compositing pawl and the let-off this double pick will not be noticeable; and for the majority of common twill and multiple harness goods this method of pick finding is satisfactory. As is well known, on many classes of goods the weaver does not take the pains to accurately match the filling but after springing the loom to the proper position throws her shuttle through the entire shed, doing by hand what is here done automatically. It is not claimed that this system of pick-finding is perfect for all grades of goods; but that it does apply to many has been shown in actual operation; and its advantages are, that it gives no waste of filling, that it requires no special bobbin or shuttle, and that its mechanism is exceedingly simple.

The fundamental characteristic of this loom is the time element and its operations are easy because they are slow and because they are independent of the weaving functions. The use of common shuttles, common bobbins, and common supplies of all kinds, the interchange between cop and bobbin filling, the high speed of the loom, the simplicity of setting and method of finding the pick are all directly connected with and largely due to the fact that ample time is given for all operations.

The last session of the meeting was closed with papers on Cotton Mixing, by Frank M. Messenger, and on The Value of a Horse Power, by Samuel Webber, which will be published in later issues.

OFFICERS FOR 1900-01.

For President: D. M. Thompson, Providence, R. I.

Vice-Presidents: Charles H. Richardson, Clinton, Mass.; George H. Hills, Fall River, Mass.

Directors for Three Years: Herbert E. Walmsley, New Bedford, Mass.; Charles H. Fish, Dover, N. H.

For Honorary Membership: Moses Pierce, Norwich, Conn.

For Active Membership: Thomas Barrett, Jr., Pres. Langley & Aiken Mills, Augusta, Ga.; Alfred H. Burnham, Mgr. Glasgow Mills, Philadelphia, Pa.; William H. Cadwell, Supt. Jackson Company, Nashua, N. H.; Charles H. Collins, Supt. Berkeley Co., Ashton, R. I.; B. B. Comer, Pres. and Treas. Avondale Cotton Mills, Birmingham, Ala.; Augustus De Cort, Treas. Beacon Mfg. Co., Boston, Mass.; T. C. Duncan, Treas. Union Cotton Mills, Union, S. C.; Charles Estes, Pres. John P. King Mfg. Co., Augusta, Ga.; Frederick B. Gordon, Pres. and Gen. Mgr. Columbus Mfg. Co., Columbus, Ga.; John T. Greenwood, R. Greenwood & Bault, Frankford, Philadelphia,

Pa.; Henry P. Meikleham, Supt. Aiken Mfg. Co., Bath, S. C.; James S. Moor, Sec'y and Treas. Olympia & Richland Cotton Mills, Columbia, S. C.; John F. Reardon, Agt. Falls Co., Norwich, Conn.; Frederick W. Reynolds, Supt. Potomska Mills, New Bedford, Mass.; Walter Rigby, Supt. Ballou Yarn Converting Co., Providence, R. I.; William H. Ritter, Gen. Supt. Johnson & Johnson, New Brunswick, N. J.; Benj. H. Roberts, Supt. Granite Mills and Fall River Manufactory, Fall River, Mass.; Thomas Henry Smith, Jamestown Cotton Mill, Jamestown, N. Y.; T. B. Stevenson, Supt. Readville Mill, Hyde Park, Mass.; George W. Turner, Supt. Argo Mills, Gloucester, N. J.; Eugene F. Verdery, Pres. Warren Mfg. Co., Augusta, Ga.; James P. Verdery, Pres. Enterprise Mfg. Co., Augusta, Ga.; Joseph Watters, Supt. Osborn Mills, Fall River, Mass.; Benjamin Wilcox, Treas. City and Bristol Mfg. Co., New Bedford, Mass.; John B. Wild, Pres. Oneita Knitting Mills, Utica, N. Y.

For Associate Membership: H. B. Ashton, Agent S. A. Felton & Son Co., Boston, Mass.; Edwin Barnes, Hetherington & Sons, Textile Machinery, Boston, Mass.; F. H. Bishop, Gen. Mgr. Universal Winding Co., Boston, Mass.; Albert L. Calder, 2d, Cotton Broker, Providence, R. I.; Joseph L. Cushing, Mfr. of Cotton Conveying Systems, Lowell, Mass.; Richard H. Hill, Agt. James Hunter Machine Co., Boston, Mass.; Francis E. Macomber, Mill Supplies, Boston, Mass.; D. K. McLaren, Mfr. of Leather Belting, Montreal, P. Q., Canada; Charles B. Moore, Agent Knowles Steam Pump Works, Boston, Mass.; John H. Nelson, Treas. William Firth Co., Boston, Mass.; E. R. Richardson, Asst. Treas. American Machine Co., Pawtucket, R. I.; J. Foster Searles, Treas. American Loom Co., Readville, Mass.; C. T. Switzler, Selling Agent, The Plomo Specialty Mfg. Co., Boston, Mass.

THE CONVENTION OF THE NATIONAL ASSOCIATION OF MANUFACTURERS.

The fifth annual convention of this important association, which includes in its membership over 1200 manufacturers in different lines of business, was held in Boston on April 24, 25 and 26. The importance of the convention was recognized by the mayor, who called together a committee of representative Boston citizens, to whom was entrusted the task of properly entertaining the visitors. A large fund was subscribed by the citizens and probably no gathering of manufacturers was ever more cordially welcomed or more hospitably entertained in Boston.

The business sessions of the convention were held morning and afternoon, and on Tuesday evening a Bohemian smoker and vaudeville entertainment were tendered to the members in the Bijou Theatre. Wednesday a public meeting was held, at which a number of prominent speakers spoke on the possibilities of the expansion of export trade in the different lines of business. The meeting terminated on Thursday evening, when a reception and banquet were given in Mechanics' Hall by the citizens of New England to the visiting members, at which nine hundred were present. Ex-Gov. Wolcott presided and speeches of national import were made by a number of distinguished speakers, including Secretaries Gage, Root and Long, the Chinese minister, Lieut.-Gov. Woodruff and others. That of Wu Ting Fang was especially interesting and contained much sound advice to American manufacturers who are looking for Chinese trade.

An efficient ladies' committee took charge of the visiting ladies accompanying members, and drives, reception parties and luncheons fully occupied their time.

The convention discussed many topics of far-reaching national import, and its proceedings will have important influence in forwarding the desired ends.

The introduction of a resolution recommending the ratification of the reciprocity treaty now pending between the United States and France stirred up a great deal of controversy. The textile manufacturers opposed the ratification of the treaty, and their spokesman, Mr. C. H. Harding, of Philadelphia, made an earnest argu-

ment in behalf of restricting the principle of reciprocity to the exchange of non-competing goods, and pointed out that the knit goods features of the French reciprocity treaty were not based on this principle. He wanted a proviso inserted in the resolution, calling for the withdrawal from the treaty of the concessions granted on cotton hosiery and knit goods. Many speeches were made for and against the resolution, its advocates claiming that in view of the great advantages accruing in most other lines of business, the treaty should be passed in order that the greater benefits might be obtained, even if there were some lesser evils, and it was suggested that after this treaty was passed, another supplementary treaty might be negotiated to correct its defects. The resolution was finally carried with the additional amendment that the interests which would suffer under the pending treaty be brought to the attention of Washington authorities with the request that they be provided for in a supplementary treaty.

Other important resolutions adopted were those urging that a commission be appointed by President McKinley to study the industrial conditions of the Orient, favoring free public commercial education; the creation of a national government department of commerce by the pending bill in the senate; favoring the pending shipping bills; and favoring the Isthmian canal bill; congratulating the present administration on the successful diplomatic efforts to establish the "open-door" system of commerce in China; petition to congress for the preparation and ratification of a reciprocal trade treaty with Canada; approving the opening of competing cable lines between the United States, Cuba and Porto Rico.

The importance of the work accomplished by the National Association of Manufacturers can hardly be overestimated. Although it has been in existence but five years, it has already accomplished wonders in facilitating export trade. It has established a warehouse in Venezuela, where American goods may be exhibited and sold. It has recently established a still more important warehouse in Shanghai, China, from which great results are expected, and it has in contemplation the establishment, at an early date, of another warehouse on the continent of Europe, probably at Hamburg.

Its methods are all practical, and it follows up its theories and resolutions by earnest and systematic work. Its members are kept in close touch with matters that affect their interest through their bureau of information, and grievances, or suggestions tending toward the betterment of trade conditions, both in domestic and foreign commerce, receive prompt attention and earnest advocacy from the working officers of the association. The aggregate wealth represented by the members and the influence of over 1200 such manufacturers in all parts of the country can hardly be over-estimated; many instances were related at the convention of the great good which had been accomplished by the concentrated effort of the association directed on some particular point. The committees appointed each year by the president to consider the most important subjects, give much time and thought to their work, and their reports to the association show the practical results from the business-men standpoint. President Search's annual report is a most comprehensive document, and covers the work of the association the past year in a thorough manner, which cannot fail to be of interest to manufacturers at large.

The fundamental principle of the association is its work for the benefit of the manufacturers of the United States as a unit, considering them as a great body of producing industries, having, it is true, many features peculiar to each line, and yet many most important interests in common, for the advancement of which unity of purpose and unity of action will enhance the prosperity of all.

The treasurer's report showed the association to be in a flourishing condition financially, with a large increase in the receipts over last year.

The following officers were re-elected: President, Theodore C. Search of Pennsylvania; secretary, E. P. Wilson of Ohio; treasurer, Charles A. Scheiren of New York. Vice-presidents were elected from each manufacturing state, and Edward H. Sanborn, the working general manager, of Philadelphia, was also re-elected.

An interesting feature was the presentation to President Search by Mr. Scheiren, in behalf of the members, of a handsome silver loving cup. Mr. Search gives a large share of his time to the work of the association, in which he is greatly interested, and to his enthusiastic efforts and unflagging zeal, its success is in a large measure due.

The next meeting will be held in Detroit in 1901.

The general scope of the work of the association is shown in the following abstract from President Search's address. The subjects referred to by him were discussed and in almost every instance his suggestions were endorsed.

PRESIDENT SEARCH'S ADDRESS.

The interval of fifteen months which has elapsed since the last annual convention of the National Association of Manufacturers has been a period of industrial activity for which there is no parallel in American history. The demand for manufactured products of every description has been almost without precedent, and with few exceptions manufacturing plants in the United States have been crowded with work to a degree that has taxed their productive capacity to the utmost. We no longer find manufacturers striving to secure a market for their product; their most serious problem is to meet the demand for their goods and to make deliveries within the time specified by purchasers. So great is the pressure of business that manufacturing operations are hampered by inability to obtain material and by a scarcity of labor, while the railroads are unable to handle promptly the fuel and materials which the manufacturers consume and the goods which they make.

There have been many predictions of disastrous reaction soon to follow this great activity; but thus far there has been no evidence of impending collapse, and all conditions point to a continuance of the present industrial activity for many months yet to come.

While as yet there is no indication that the output of our factories is approaching the limits of what our people can consume, there is still less evidence that our foreign markets are likely to lessen their takings of our products.

Industrial Europe is now seriously hampered by a scarcity of fuel, due to the enormous demand from manufacturing enterprises, and at the present time it is impossible to procure from any source a supply of coal with which to meet the constantly increasing requirements. The gravity of the situation is apparent to all who read the reports from European manufacturing centers; and it is easy to see that this embarrassment of the manufacturers of Europe only tends to prolong the period of activity in the United States. It is to this country that Europe looks in an emergency for what her home industries cannot supply.

In spite of the great demand at home, in spite of delayed deliveries and advanced prices, in spite of the reluctance of many of our manufacturers even to consider any orders from abroad, the exports of manufactured goods from the United States showed the largest increase during the last fiscal year that has ever been recorded. During the year ended June 30, 1899, the exports of domestic manufactures reached a value of $338,675,558 as compared with $290,697,354 in the year preceding, a gain of $47,978,204. Over 28 per cent. of the total exports in 1898-9 consisted of manufactured articles. For the calendar year 1899 the increase was even more

remarkable, the exports of manufactures having reached a total of $280,787,891, which was over 30 per cent. of all the exports of every description.

The work of the National Association of Manufacturers has been pushed with much vigor during the past year. All of those lines of work to which the Association has been committed in years past have received their full share of attention and several new departures have been made with much benefit to the membership and to the organization as a whole.

The interests of our members have had very efficient representation in Washington and the influence of the Association has been manifested in many ways and upon many occasions.

Those who are familiar with the course of events in Washington know very well how difficult it is to measure the results of such work as this and how little significance can be attached to the visible results as an indication to the work that has been done. The legislative measures in which this Association is interested are all matters of great public moment. They are not bills that can be hastily passed, but in every instance their progress through the House and Senate is marked by long continued discussion, most careful and searching consideration and innumerable delays.

I believe that our policy during the past year has been the most proper and most effective course that could have been pursued, and I am confident that the continuance of this work along the same line will accomplish more than could be done by any other means. The serious consideration that is afforded to every suggestion that is put forth in the name of the National Association of Manufacturers cannot fail to impress one with the strength and influence of this organization as a factor in national legislation.

No legislative measure that has come up for consideration since the organization of the National Association of Manufacturers has commanded such hearty support from our members as the bill for the encouragement of the American merchant marine which is now pending in both the House and Senate. The measures now before Congress are the result of long-continued efforts to shape a governmental policy calculated to revive our declining merchant shipping and to impart to that great agency of commerce the same degree of strength and vitality that characterizes our productive industry.

DEPARTMENT OF COMMERCE AND INDUSTRIES.

Several bills for the creation of a Department of Commerce and Industries have been introduced during the past session of Congress. Their general purpose is the same and they have differed simply as to details.

Very few measures that have come before Congress in a long term of years have had such powerful support as the several bills for the creation of such a department which have been introduced during recent Congressional sessions. There is hardly a business organization of consequence in the entire country that has not strongly voiced its desire for the creation of a Federal department of this character.

NICARAGUA CANAL.

The Nicaragua Canal has occupied an unusual share of public attention during the past six months and the most interesting development is the proposition for the direct construction of this canal by the United States Government. Of equal importance is the treaty negotiated between the United States and Great Britain, which aims to insure the complete neutrality of the canal at all times and under all conditions.

Probably never before have we been so near to the actual construction of an isthmian canal by the United States Government. In the negotiation of this treaty, in spite of some of the objections that have been raised, and in the general attitude of Congress, there is much encouragement for the belief that we shall soon see

this project in shape for the beginning of actual work.

Whenever Congress shall make it possible for the United States Government to undertake the construction of this canal there should be no cause for further delay in the beginning and vigorous prosecution of the actual work. The uncertainties of legislation render it hazardous to venture a prediction concerning the fate of the bills now pending, but the present situation is full of hope and encouragement to those who are anxiously awaiting the construction of an interoceanic waterway through Nicaraguan territory as a purely American enterprise.

RECIPROCITY TREATIES.

The attempts on the part of the United Sfates Government to negotiate treaties of commercial reciprocity with France and the Argentine Republic have been disappointing to those who looked for substantial benefits to American commerce from such agreements. Not only does the treaty with France, as signed by the representatives of both governments, unnecessarily sacrifice important American interests, but also expressly excludes from all benefits under the agreement several American industries that have sought to secure the advantages that would be derived from the application of the minimum rates of the French tariff to their products.

When the subject of commercial reciprocity between France and the United States was discussed at our annual convention in New York two years ago, those who were most strenuous in their desire for such a treaty were the builders of machine tools. Now that the treaty has been negotiated and is awaiting ratification it is fourd that this industry in particular has been expressly excluded from the concessions that have been granted to other industries. In similar manner pig iron, boots and shoes, leather belting, dynamos and arc lamps are excluded from the reductions which are given to other articles of American manufacture. As in most cases these articles are subjected to from 30 to 50 per cent. higher duty when of American manufacture than when made in countries with which France has tariff conventions, it is easy to see the disadvantage under which these particular American industries operate when they attempt to sell their goods in France.

In addition to these discriminations the concessions which are given to France in the shape of reductions in the rates of duty in our own tariff form a very serious objection to the pending treaty. It is agreed, according to this treaty, that French cotton hosiery and knit goods shall be admitted into the United States under a reduction of 20 per cent. from the duties specified in our tariff. The hosiery manufacturers of the United States view this phase of the treaty with great alarm and declare that it will work great damage to their business. There are also several other important branches of industry which claim that they would be greatly injured by the proposed concessions in favor of imports from France. While recognizing the great advantage that would be bestowed upon many of our industries by this treaty, we must not lose sight of the injury that would be inflicted upon others, nor can we accept it as a correct principle upon which treaties of commercial reciprocity should be based that any of our industries should be favored at the expense of others, no matter how small may be tne industry whose interests are sacrificed.

As president of this Association I have found myself in an embarrassing position, as I have been subjected to the strongest kind of pressure from those members who desired the ratification of the treaty as well as from those who were equally earnest in their desire to secure its rejection. Under such conditions, confronted with such a conflict of opinion among our own members, I have not felt justified in speaking officially for the

Association either for or against the treaty. When there is such a conflict of interests the proper position for us to assume can be determined only by a free discussion of both sides in open convention. This is a subject, therefore, which this convention should discuss in order that our position may be definitely determined.

Objections to the proposed treaty of commercial reciprocity with the Argentine Republic are based not so much upon possible injury to American interests as upon the theory that the concessions which the Argentine Republic is willing to give are an inadequate return for the reduction we are willing to make for the duty on Argentine wools, hides and sugar. It seems to be the prevailing belief that there should have been much more liberal concessions by the Argentine Republic in view of the great advantages that country would derive from the freer entrance of its wools and hides into the United States. The present specific duties in our tariff discriminate unfairly against the Argentine Republic by subjecting wools from that country to the same rates of duty that are imposed upon much cleaner wools coming from other countries.

As a matter of justice, if not expediency, this discrimination should be corrected, and it is unfortunate for our commercial relations with the Argentine Republic that the pending treaty has been so vigorously opposed by those who are unwilling to recognize the injustice of the present wool duties in their bearing upon the Argentine. The failure of the United States Senate to ratify this treaty has caused much ill feeling in the Argentine Republic, as I have lately had occasion to observe from information sent to us by correspondents in that country.

It is disappointing to those who have looked for so much from the reciprocity provisions of our present tariff law that so little has come out of the negotiations that have been in progress during the past year. There seems to be little prospect of the ratification of either the French or Argentine treaties, and thus will be lost two great opportunities for the extension of our foreign trade by applying the principles of true reciprocity in commerce.

THE CONSULAR SERVICE.

So much has been said about the defects in our consular service and the evils of the system upon which it is based that it seems quite unnecessary to enter into any arguments to prove the weakness of this important arm of our government. On the contrary, I feel like saying a word in defense and approval of the members of the consular service.

It is the tendency among those who have not been brought into intimate relations with the consular service to condemn the whole institution in unqualified terms. That is doing great injustice to many very able and honorable men who occupy positions in the service with credit to themselves and honor to our country.

A somewhat intimate acquaintance with many of our consular officers acquired through the work of the National Association of Manufacturers, and a careful investigation of the records of a large number of them, have revealed to me many men of marked ability as well as many who seem both unqualified for and unworthy of the positions they hold. While we condemn the system and deplore the evils which exist, we should not fail to recognize merit wherever it is found. It is the system that is at fault rather than the men. The personnel of the consular service is about as good as could be expected under the prevailing system, and efforts to improve it will prove unavailing until the root of the evil shall have been removed.

AMENDMENTS TO THE INTERSTATE COMMERCE LAW.

The need of a uniform national classification of freight was one of the first subjects that was brought to the attention of the National Association of Manufacturers at the time of its

formation five years ago, and this organization has supported with much energy and persistence the movement to secure the legislation necessary for the establishment of such a classification. During the past year the Association has given its support independently and in conjunction with the League of National Associations to the proposed amendment to the Interstate Commerce Law provided by Senate bill 1439, generally known as the Cullom bill.

PARCELS POST.

The attitude of the National Association of Manufacturers with reference to the use of the postal service for the conveyance of small parcels has been defined frequently and with emphasis. The Committee on Parcels Post has given this subject very careful consideration during the past year and its work has greatly strengthened the movement in behalf of the extension of this arm of the postal service.

COMMERCIAL POSSIBILITIES OF THE ORIENT.

Recent political and commercial developments in the Far East have been of the utmost interest and importance to the manufacturers of the United States. There is much ground for gratification in the success that has attended the efforts of Secretary Hay to secure the committal of the Great Powers to the maintenance of an open-door policy in China. Through the initiative of the Secretary of State, Great Britain, France, Germany, Russia, Italy and Japan have been induced to give assurance that in any Chinese territory that shall come under their jurisdiction all nations shall be entitled to equal commercial rights.

FOREIGN SAMPLE WAREHOUSES.

In the extension of the system of sample warehouses in foreign countries under the control and management of the National Association of Manufacturers the most important step has just been taken in the establishment of a warehouse in the city of Shanghai, China.

In the belief that no point in the world offers at the present time greater possibilities for an establishment of this kind your Executive Committee authorized this undertaking, and entrusted your president with the arrangement of the details. I take great pleasure in reporting that we have secured by lease one of the finest commercial buildings in the city of Shanghai. It has been altered and prepared to suit our purposes, two large shipments of samples are on the way to China, and the first of them is probably being discharged from the steamer and conveyed to the warehouse as I read these lines.

The plan and scope of this warehouse are somewhat different from the basis upon which our first warehouse in Caracas, Venezuela, is conducted. To make this establishment most effective in creating trade and to meet the wishes of those members who are participating in and supporting it, the warehouse has been organized in such a way that it not only provides for the display of samples but also for the actual sale of the goods represented in the show-rooms.

This warehouse consists of two distinct departments, one for the display of goods manufactured in the United States and the other for the sale of this merchandise. The exhibition department belongs solely to the Association and is wholly under our control and management. The selling department has been organized as an adjunct to the exhibition department upon lines approved by the management of the Association, and the conduct of its business must be at all times subject to our approval and direction.

In this way we have provided for the members of this Association, and for them exclusively, an establishment which provides the best possible facilities for the introduction of their goods into China. They have the benefit of a well-conducted show-room at a minimum cost, and the selling department will make sales for them and pay for the goods before they leave the United States.

This Association does not undertake to transact any business upon its own account, has no charter to engage in such operations and does not contemplate any operations of this character. The functions of the Association cease when it has provided all the necessary facilities with which its members can transact business.

Under the plan upon which the "American Warehouse in Shanghai" has been organized the Association has provided all these facilities and has taken all possible precautions to protect its members against losses or even risks. Through the agency of this warehouse it is now possible for any of our members to transact business in Shanghai with as much facility and with as great safety as they can sell their goods in New York or Chicago.

The next step in the extension of our warehouse systems will probably be the opening of a warehouse in Hamburg, Germany, upon lines similar to those that have been followed in Shanghai, modified as circumstances may require. The establishment of a warehouse in Hamburg has been under consideration for three years past, and arrangements are now so well advanced that within a very short time the details will be ready for presentation to the members of the Association.

INTERNATIONAL FREIGHT BUREAU.

One of the earliest developments in the work of the Committee on International Freight and Transportation was a suggestion for the establishment of a bureau in New York for the handling of export shipments for members of this Association.

The function of this bureau is to attend to all the details of forwarding and shipping for members of this Association, engaging freight space, preparing papers, arranging for insurance and when desired making collection of invoices. The operations of this bureau are based upon the theory that the control of a large volume of freight coming from a number of different shippers and passing through one channel will command consideration and favors which an individual shipper would not be able to secure. It is obvious, therefore, that the success of such a bureau must depend upon the amount of business which it handles. The more it is patronized by our members and the larger the volume of business transacted, the greater will be the benefit to those who make their shipments through this channel.

Even during the first year of its operations, starting without any support and compelled to perfect an elaborate organization extending to every important port in the world, the results that have been obtained by the bureau have been very satisfactory and have demonstrated beyond question the correctness of the principle upon which it is based. During the year covered by the report of the director 555 shipments have been handled, aggregating 5,572 cubic tons and valued at $166,100. On these shipments there has been saved to the shippers an average of 15½ per cent. on freight and insurance as compared with the charges which the shippers would have had to pay if they had not availed themselves of the facilities of the bureau.

PUBLICATION DEPARTMENT.

The work of the Publication Department expands rapidly and along lines that are calculated to confer great benefits upon our members. During the fall of 1899 the publication of a Spanish edition of the descriptive and classified membership directory of the Association was completed under the title of Indice del Comercio Americano. This directory, printed throughout in Spanish, forms a handsome volume of 425 pages, and 5,000 copies have been distributed in those countries where the Spanish language predominates in commercial life. The distribution of these books has served to bring the members of the National Association of Manufacturers promi-

nently before foreign merchants with an efficiency that would not be obtainable by any other means. That these books are highly appreciated by their recipients is clearly shown by the voluminous correspondence that has resulted from the distribution of the Spanish edition. From every part of the world where that language is understood inquiries are coming from those who have received the book or have borrowed it from more fortunate friends, and there is no question of the practical results that have followed the correspondence and negotiations begun through this directory.

For several months past the Publication Department has been engaged in the preparation of another edition, which will contain the same material in both English and French within one volume. This work is approaching completion and a large edition will soon be ready for distribution. The holding of the great Exposition in Paris this year makes the publication of this edition very timely and affords opportunity to reach a class of merchants for whose use previous editions of the book have not been adapted.

CONCLUSION.

Upon the theory that this is an age of specialization, that narrow fields of work must be chosen to insure success, it has been predicted again and again that the broad purposes and very general aims of the National Association of Manufacturers would be fatal not only to its success but even to its very life. Five years of constant growth, continual expansion of its work and adherence to a policy that has broadened rather than narrowed, seem to prove that this theory is not universally applicable and that this Association is a somewhat striking exception to the prevailing tendency towards specialization.

Few of us can realize the tremendous energy that can be put into any line of work, any undertaking, when twelve hundred of our greatest captains of industry are ready to put head, heart and hand to it.

Unity is the element which determines the success of this Association—unity of purpose and unity of action. Individual profit, personal gain or selfish motives never can put this organization forward a single step. We are working for the benefit of the manufacturers of the United States as a unit, not as makers of pig iron, spinners of cotton or builders of engines; but as a great body of producing industries whose interests are common, whose needs are the same and who must recognize that the continued prosperity of the individual depends upon the well being of the whole.

MORE MILLS OR BETTER MILLS.

The textile industries are now sharing in the generally good business conditions. With general business good, the tariff and fiscal policies of the government settled for several years, the outlook seems bright.

Keeping in mind the old saying that it is the unexpected which happens, we may congratulate ourselves on a clear sky and the prospect of pleasant weather.

As a result of the increased demand for goods, the mills are busy and many new extensions are projected. Under these conditions it may be well to call attention to another way in which production may be increased other than by building new mills. This is by improving the old ones. The comparative merits of the two methods are best shown up under adverse conditions of manufacturing, and a brief review of the lessons, learned so recently in the hard school of experience, may be beneficial. That school has had so recent and prolonged a session, that no excuse can exist for forgetting its lessons. But a short time ago mills were generally idle or running at a loss; profit had disappeared, and shut downs, failures, impairment of capital were the order of the day. Under those conditions it was the poorly equipped mill that suffered first and worst. The up-to-date plants,

where the cost was at the lowest point, were able to meet the lower prices then prevailing, and still make a profit or avoid a loss. An ample margin of profit may for a time permit the poorly equipped mill to exist, but with a profit within reach nothing can or should prevent an increased production of goods, and this increase can have but one result, the lowering of the price and reduction of the profit. Manufacturers should not let present conditions exert too great an influence on their minds; it is but a very short time ago when it was hard to believe that times would ever be good; today some of us are beginning to think they will never again be bad. The danger from this sentiment is reckless and ill advised building of mills without effecting any economy in manufacturing. No mill should be enlarged until the existing machinery and processes have been brought to the highest possible efficiency, and give the lowest cost and best product. Mill stockholders should not judge their mills leniently in this respect.

An unbiased comparison of present methods with the best possible, often affords the most striking contrasts; one case came under our personal observation, an extreme one perhaps, but still an actual one, in which the increased labor cost of spinning woolen yarn on the old machines equalled in three and one-half years the amount required to pay for new spinning machinery. Before building new mills let this test of comparing the old with the new be applied to every department which affects the cost of goods, and then let the inferior machines and processes be discarded for the best.

Again, we have learned from the hard times certain lessons about methods of manufacturing, one of the most valuable being the advantage obtained by specializing mill work.

A mill, in which a dozen different fabrics are made, cannot produce any one of them at as low a cost, or as well, or in as large a quantity, as the mill making a specialty of one grade. The mill on a special line has the advantages of the help becoming more skilful and efficient, making better goods, more of them, at less cost with higher wages, and the machinery can be specially adapted for the goods made. It is the mill running on special lines, which will continue to be the most successful.

After this policy of improving the old mill is completed, it will be time to build as many new ones as the market for goods warrants.

It is loudly proclaimed that the cotton is to be manufactured into goods for the world in this country, where the cotton grows.

This may be so; but when? There is no better way of hastening this result than by a reduction in the cost of manufacturing by means of the best machinery and processes that can be obtained. Nature has done much to make this country a great textile manufacturing centre. Let us by improving our mills do what we can ourselves to make American textiles as good as any made, and make it possible to sell them in any market of the world.

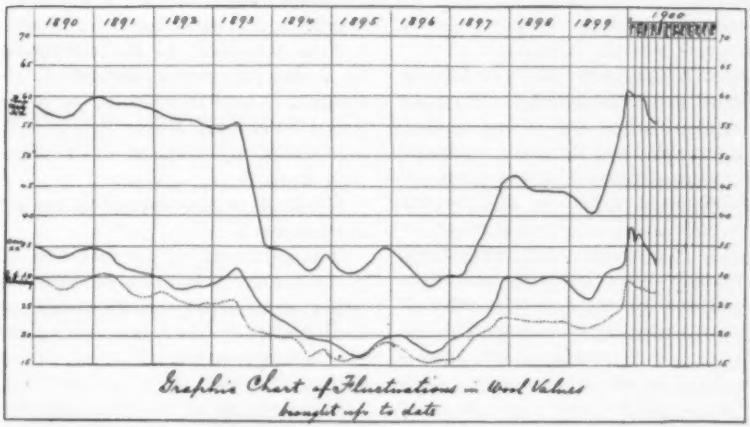
The equipment, thus obtained, will be the greatest safeguard in times of business depression.

—Twelve new cotton mills to operate 880,000 spindles are being built in England. 449,490 spindles is the increase this year over last, and 9840 looms. The total number of spindles in January in operation in England was 42,640,200 and 648,820 looms.

—The New Zealand hemp trade is still very active. Throughout last year the demand has been in excess of supplies, and all the mills, particularly those in the Manawatu district, have been working full time.

—When the term "extra weft" or "extra warp" is used it is often expected that if the extra material be removed the ground cloth will form a complete fabric minus the ornamentation obtained by the use of the extra yarn.

THE WOOL MARKET.



Graphic Chart of Fluctuations in Wool Values brought up to date

The wool market during April and early May both in this country and abroad, has been extremely dull. Prices have declined on the few transactions made. Holders have not pressed their wool for sale, and no large sales could probably have been made, except at marked concessions in price. Manufacturers have kept out of the market for the last three months, and as yet show no signs of changing this course. The stock in manufacturers' hands must have been very large, as mills have been running to their full capacity. It is estimated that 450,000,000 pounds of wool have been consumed during the last nine months, and yet manufacturers are making no purchases, except to supply in small quantities certain grades which may be running low. Coarse wools have suffered least in the prevailing dullness. Desirable lots found a ready sale at very slight, if any, concession in price.

The demand for goods has slackened, and a few manufacturers have been short of orders to cover their production for the season. This condition, just before the arrival of the new clip, makes manufacturers and dealers cautious in making purchases. A study of wool prices in past years will show, almost invariably, at this time of year, a condition similar to that now existing. Holders of wool in the country have been very firm in their ideas, as to values, and have declined to accept any lower prices. The stronger financial condition of the West has continued to exert a steadying influence on the wool market. Australian advices show a large decrease in exports for the last eight months. The consumption of wool has been very large, and in the face of the strong statistical position of wool throughout the world, the market still persists in a downward course. Sales in Boston, New York and Philadelphia markets for four weeks ending April 28th are 18,155,000 pounds.

COTTON MARKET.

The market has exhibited no marked features during the month of April, the only movements being due to speculation, based on varying reports as to weather and crop conditions in the South, and the more quiet tone of goods market. This speculation has been confined within narrow limits, bull traders' evidently feeling that the strong statistical position of cotton has been fully discounted by the high prices prevailing at the present time. The bear traders have naturally been unwilling to make new contracts in the face of the strong position which the staple now occupies throughout the world. The Texas

floods and unfavorable weather reports from the South have served to strengthen the market, but this has been neutralized by later reports of improved weather conditions.

English spinners have persistently declined to accept bullish views on the future course of the cotton market, and have refused to make contracts for future delivery. The market for manufactured goods in Europe has been more quiet. The situation of domestic goods has been unchanged, and there have been no influences strong enough to move the price of the raw material either way. The visible supply of cotton at the present time exhibits a marked decrease from the supply at the same time in either of the last three years.

The figures, compiled by the Financial Chronicle, irdicate that on April 28th the total visible supply of cotton throughout the world was 1,530,756 bales less than at same date in 1899, 1,003,500 bales less than in 1898, and 415,904 bales less than in 1897.

These figures certainly do not afford any basis for a belief in a decline in price of the staple for the next few months, other than the customary reaction after a pronounced advance.

The government crop report is due on May 10th, and there is a general disposition to await its appearance before entering into new contracts.

New York quotations for spot cotton have ranged from 9⅝ to 9 13/16 for middling uplands, the latter figure prevailing as the month closes.

Meeting of Southern Cotton Spinners' Association.

The annual meeting of this association is held in Charlotte, N. C., May 11th and 12th, as we are in press.

A very interesting programme had been arranged for the meeting. Papers were read on such timely subjects as Developing Foreign Markets for American Cotton Goods, by Theodore C. Search; Steam Power, Its Economy, by D. A. Tompkins; Electric Transmission, by Sydney Paine, Boston; Importance in American Cotton Machinery, by George O. Draper, Hopedale, Mass.; Fine Yarns in the South, by Arnold B. Sanford; Legislation in Reference to Manufacturing, by James L. Orr, Piedmont, S. C.; Production of Finer Goods, by A. H. Lowe, Fitchburg, Mass.; Sale of Cotton Goods, by Leonard L. Paulson, New York.

We shall publish several of the addresses later.

It is gratifying to see that this important association has adopted the policy of discussing technical subjects connected with their business of cotton manufacturing. The advantage to manufacturers of a mutual study and interchange of views on manufacturing cannot be easily under-estimated, and the manufacturing interests of the South will derive great benefit from such meetings as this.

Elastic Web Calendering Machine.

Attention is called to the new finishing machine built by C. H. Knapp, corner of Wait and Rye Sts., Paterson, N. J. The illustration in Mr. Knapp's advertisement, on page 938, gives a very good idea of the machine. It calenders elastic webbing, garters, suspenders and such fabrics, and shrinks and sizes the goods on both sides. It makes the webbing straight, and after being put through the machine, it never shrinks, while, at the same time, it stretches the web.

Mr. Knapp has given careful attention to this subject, and has produced a machine which is designed to meet the requirements of manufacturers of this class of goods in every respect. Already a number of machines have been installed, among those using them being the American Mills, Waterbury, Conn.; Narragansett Webbing Co., Pawtucket, R. I.; Ansonia O. & C. Co., Ansonia, Conn.; Nashawannuck Mfg. Co., Easthampton, Mass.; Montgomery Textile Works, North Wales, Mass.; National Elastic Fibre Co., Providence, R. I., and G. S. Colton, Easthampton, Mass.

COTTON DEPARTMENT.

Types of Woven Fabrics.

THEIR CHARACTERISTIC FEATURES, CONSTRUCTION AND MANUFACTURE.

ARTICLE V.

HARRY NISBET.

(Copyright.)

A typographical error occurred in the April article of this series, on page 636, in calling the illustration thereon "Plan 5," instead of Fig. 20.

A separate set of cards is employed to actuate hooks B1 (Fig. 21, Art. IV.) which control the healds; and as this set passes over a separate cylinder working independently from that of the figuring set, very few cards are required; also, the binding weave of the fabric may be readily changed with little cost, by replacing one set of cards by another, so as to operate the healds in a different order.

As griffe A1 must rise and fall, and its cylinder move out and in for each pick, both may be operated from the crank shaft if employed on a power-loom, since the latter makes one revolution for each pick; but if employed on a hand-loom, they should be operated by a treadle independently from that which controls the principal machine.

A modification of the pressure harness is illustrated by Fig. 26. Instead of one set of healds having large eyes, twice the number of clasped healds, forming two sets, and arranged in two tiers are used. One set, A, has warp-ends drawn above the clasp to form a "straight-through" draft, and is used to raise ends singly to bind the ground portion; and the other set, B, has warp-ends drawn below the clasp in the same order, and is used to depress ends singly to bind the figured portion of the fabric. The plan Fig. 27 shows the drafting for this arrangement of harness. Dots indicate warp-ends drawn above, and circles indicate them drawn below the clasps. Fig. 28 shows the manner in which healds must be operated for a 5-end satin binding weave. Dots indicate healds lifted, and circles, healds depressed.

One of the most objectionable features of the compound pressure harness is that it puts enormous strain upon warp-ends at such times as they are either held down or raised by the healds, whereby they are made to occupy extremely opposite positions within a comparatively short interval of space. This evil may be minimized

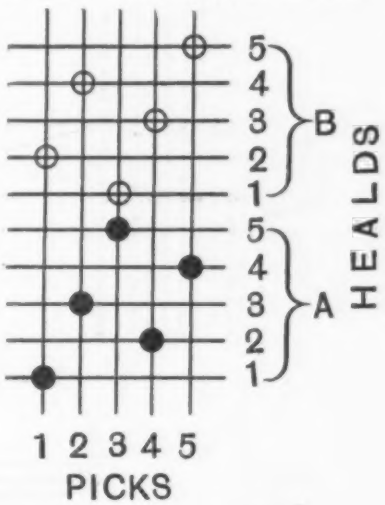


FIG. 28

by setting the figuring harness well back from the healds, and making a small shed. The latter condition involves the use of shuttles having a small weft-holding capacity, and consequent frequent stoppage of the loom to replace weft as it gives out. Also the heald harness, especially when employed in two sets as shown in Fig. 26 is cumbrous and takes up a great amount of space, which is an important consideration in the economics of present-day manufacturing.

For these reasons, the pressure harness is not nearly so well adapted to the requirements of a power-loom where the warp is subjected to more

or less severe treatment, as to a hand-loom where all operations are under the control of the weaver.

These circumstances, combined with the enormous cost necessarily incurred in the slow production of damasks by means of the hand-loom, have given birth to numerous devices to enable such fabrics to be more expeditiously and economically produced by power-looms, without the attendant drawbacks of the pressure harness. These devices consist of jacquard machines of special construction and known as "damask" or "twilling" machines. They exist in a variety of forms, for each of which some special merit is claimed by their inventors: but whatever their relative merits may be, none are capable of producing fabrics of the extreme fineness of texture or general excellence as is possible with the pressure harness; as in the latter, any reasonable number of contiguous warp-ends may be controlled by each harness thread, whereas single warp-ends only are controlled by each harness thread of a damask machine. Many of these contrivances display a considerable amount of technical knowledge and mechanical ingenuity of a very high order; and al-

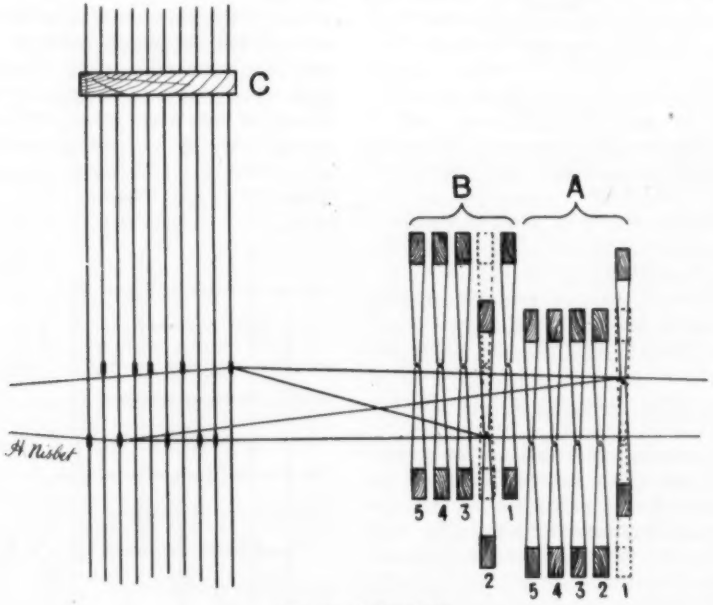


FIG. 26. ELEVATION.

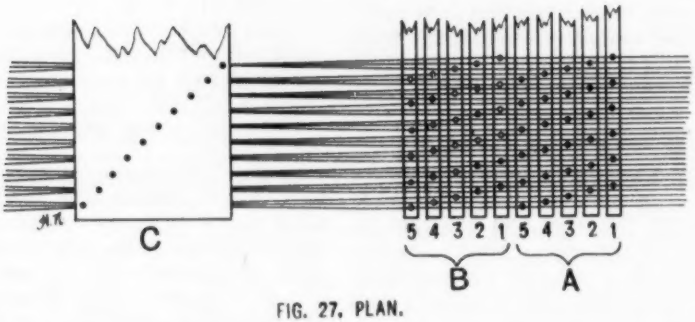
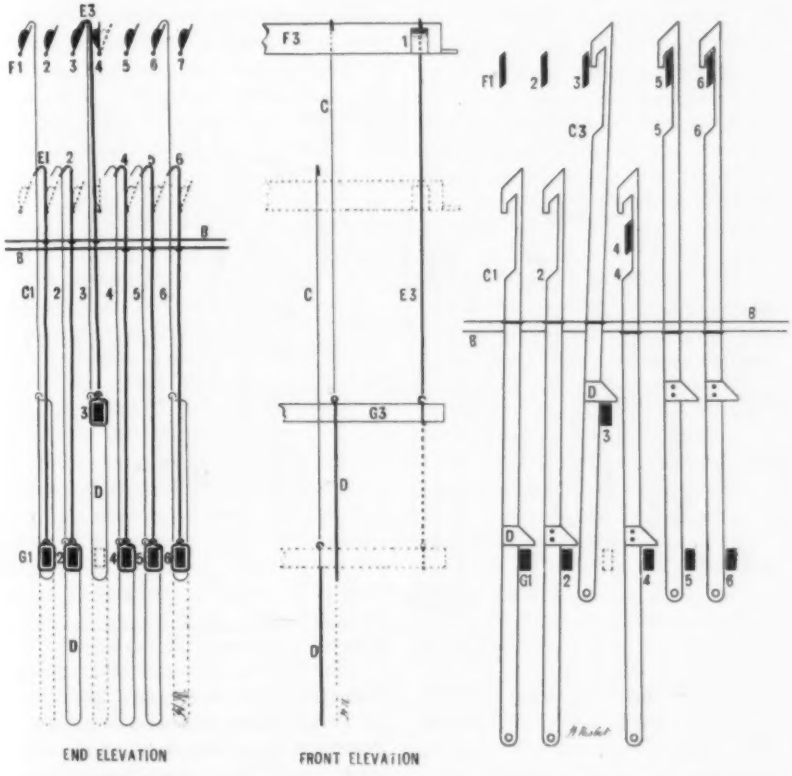


FIG. 27. PLAN.

though dissimilar in point of detail and operation, an examination of them will show that they are based upon similar principles, namely: (1) the controlling of two or more consecutive hooks by each needle; (2) the raising of hooks from two sources in such a manner that some many be left down and others raised in some regular order for binding purposes, irrespective of the manner in which pattern cards have been cut; and (3) the employment of each pattern card for one, two or more picks in succession, according to the particular binding weave or weaves desired.



END ELEVATION FRONT ELEVATION

It would be a difficult task, and for the purposes of these articles, a useless one, to give even a brief description of the numerous attempts to bring the power-loom into successful competition with the hand-loom in the production of damask fabrics, few of which attempts have met with even partial success. Of these, that known as the Bessbrook damask jacquard is perhaps the most successful and best known. It was invented by Henry Barcroft, of Newry, Ireland, and patented by him in January, 1869, since which time, it has undergone various modifications and improvements, and is now largely employed in the production of linen and cotton damask table-covers, napkins, and similar fabrics.

Figs. 29-31 show the essential parts of this ingenious device. In Fig. 29, two needles, B, each controlling three figuring hooks, C, are shown. In a "straight-through" tie-up, each hook C commands a separate warp-end in each repeat of the pattern; and hooks controlled by the same needle command contiguous warp-ends. Long loops, D, are formed at the bottom of

hooks C, to receive twilling bars G, each of which passes through and supports one long row of hooks. Strong hooks, E, are attached, one at each end, to the twilling bars, by which the latter may be raised; in which event, all figuring hooks C resting upon them are also raised, although they may have escaped their griffe blades. Griffe blades F are capable of swivelling from their normal inclined position to a vertical one as seen in F4; also, they are provided at blades. These bars are fixed above, and at one end of the griffe blades, and are operated by means of pegs fixed in barrel N, so as to move griffe blades in such a manner as will cause figuring hooks to be raised and left down according to the binding weave desired. The interval,—measured in rows of hooks—between the notches, and also the number of bars used, determines the number of ends and picks upon which the binding weave may repeat. For a 5-end twill or satin

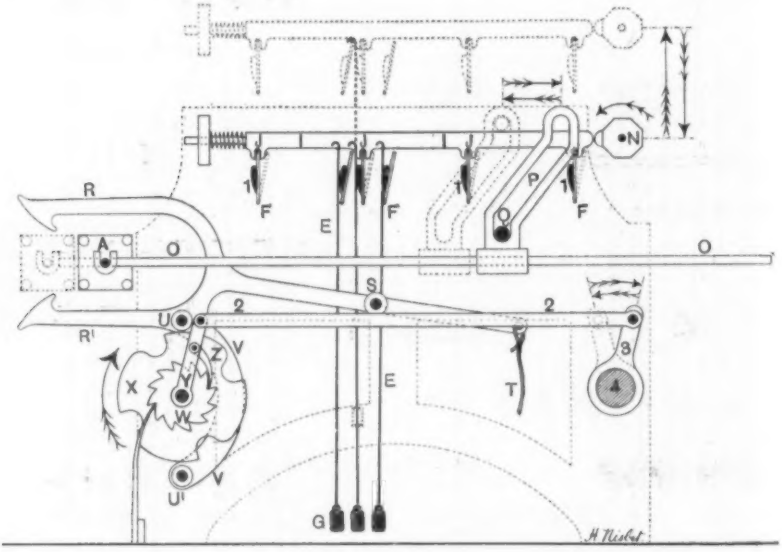


FIG. 63.

each end with a shaped piece of metal I, situated immediately behind the strong hooks E. When griffe blades F assume a vertical position, they have the double effect of leaving down their own rows of hooks, and, by pushing strong hooks over the griffe blade immediately in front, causing all hooks in those rows to be raised by their twilling bars, although they may have been pushed off their own griffe blades by the pattern cards.

Griffe blades F are moved from their inclined, to a vertical position by means of a series of bars I, Fig. 31, provided with notches J at regular intervals which take over the griffe weave each bar commands one griffe blade out of five; and five, or a multiple of five bars will be required; and for an 8-end weave, eight bars will be required, with each bar commanding every eighth griffe blade. Only such binding weaves may be used as repeat on a number of ends equal to the number of rows of hooks, or any measure of such number; for example, if there are 24 rows of hooks, as usually obtain in machines for the linen trade, binding weaves repeating on 3, 4, 6, 8, 12, and 24 ends may be used. The number of griffe blades must exceed the number of rows of hooks by one, which is a dummy blade

for the purpose of pushing strong hooks in the last row over the last griffe blade proper when the first one is vertical, whereby all hooks in the last row are raised, and all in the first row left down. Thus, if it is required to make an 8-end weave with a machine containing 24 rows of hooks, the first bar I, must command griffe blades Nos. 1, 9, 17, and the dummy 25.

As the machine is single-acting, griffe blades F, with bars I and barrel N rise and fall, also card cylinder A moves in and out, for each pick. At each ascent, the barrel is turned so as to bring a fresh set of pegs to act upon the ends of bars I, whereby, as the griffe ascends, other rows of hooks are raised and left down to form the binding weave, although each pattern card may act for two or more picks in succession.

The card cylinder is moved out and in by bowls Q acting, as they ascend with the griffe, upon swan necks P, which latter, are secured to rods O carrying the cylinder.

By a very ingenious arrangement, the card cylinder may move out and in any number of times before it is turned to bring a fresh card to act upon the needles. This is accomplished by causing tappet X to move turning catches R, R1, fulcrumed at S, so that the cylinder escapes them as it moves out; but on the last pick of each card, the top or bottom catch is brought into action, according as the cylinder is required to turn forward or backward respectively. Two bowls U, U1, are carried, one above, on hook R, and one below the tappet, at the end of arm V. When the card cylinder is required to turn forward, bowl U rests freely upon the tappet; but if required to turn backward, bowl U1 is held against the tappet by pulling down cord T. The tappet shown in Fig. 31 is constructed to change cards after three picks. The elevations put catches out of action for two picks, and the depressions put a catch into action for one pick to change the card. The tappet makes one revolution for every four cards, or twelve picks; and is turned by means of ratchet wheel W moved one tooth for each pick by pawl Z. The latter is carried by arm Y fulcrumed on the tappet pin, and oscillated by means of shaft 4 through the medium of arm 3 and connecting rod 2.

A damask machine patented by J. Tschorner and K. Hein, A. D. 1887, is partly illustrated in Fig. 32, where six hooks and two needles only are shown. Its object, like that of the Bessbrook machine, is to dispense with the use of a heald harness, and to save cards, in the production of damask fabrics by means of power looms. Hooks C, which are formed out of thin sheet iron, have projecting pieces D affixed to them, by which they are supported upon twilling bars G. Instead of fixing griffe blades F in a framing, and raising all together, they are actuated independently by means of a corresponding number of treadles operated by tappets. Twilling bars G are also operated independently by means of another set of treadles and tappets.

The use of so many treadles and tappets renders the machine very cumbrous and complicated, without any compensating advantage being gained, excepting that seeing the griffe blades and twilling bars are operated independently from each other, instead of conjointly, as in the Bessbrook machine, a binding weave repeating on a different number of ends may be employed for the figure from that of the ground; although both must repeat on a number of ends that is a measure of the number of rows of hooks in the machine; also, if this course is adopted, care must be taken to select such weaves as either repeat on an even number of ends, or of which one is an exact measure of the other; otherwise it would sometimes happen that a row of hooks intended to be left down by a griffe blade to bind figure, would be raised by a twilling bar, causing long floats of warp to appear on the face, and long floats of weft at the back of the fabric.

Practical Notes on Cotton Spinning.

WM. SCOTT TAGGART.

Multipliers for the twist per inch in flyer frames:—If a practical man in a mill is asked what twist per inch he puts into his rovings, the probability is that he will refuse to answer, or if an answer is given it will be a very general one. Now there are two reasons for this, one is, that such an item of information is important and there is a natural reluctance to impart it to outsiders; the other reason is that in many mills,—one might almost say most mills,—the information is not known definitely by anyone in the concern. In some way or another the present working conditions of a mill are the result of many experiments made in the dark, where at last a condition of twist is found that suits apparently the cotton being worked; nobody has taken the trouble to calculate the twist, they simply know that it works all right and the results are satisfactory.

No serious complaint can be made against this system if the same conditions exist for long periods of time; but in cases of frequent change, an enormous amount of time and material is wasted in searching for right conditions and this frequently means the difference between a successful and an unsuccessful mill.

It will be our purpose in this article to suggest methods of systemizing practical experience in this direction and also to give the experience of others, so that the younger workers will have a suitable guide in satisfying their wants.

It is unnecessary to discuss the question why the numbering of roving and yarns depends on the square of the diameter, it is sufficient to mention the fact. Some interesting remarks, however, might be made as to why the square root is always taken for a basis upon which to estimate the twist per inch; for the present, though, we will content ourselves by giving an example showing the difference between using the square and the square root for estimating the twist.

Suppose two rovings of 4 and 9 hanks are taken. If these numbers are squared we get the numbers 16 and 81, which would give five times the twist per inch for the 9-hank roving as compared with the 4-hank roving. If, however, we take the square root of the numbers 4 and 9 we get 2 and 3, in which case the 9-hank roving would have 1½ times the twist per inch of the 4-hank roving. Now notice the difference between the two systems. The reason is simple, it rests on the fact that the higher the numbers the thinner the roving or yarn, and the thickness or diameter of the yarn is in proportion to the square root of the number as compared with the square root of the number of any other yarn. Hence the square root is the basis for estimating the twists per inch in yarn.

In the majority of cases it would give too few or too many twists per inch if the square root of the hank was simply taken, so it is usual to take the square root and multiply by a constant and it is on the choice of this constant that the whole matter depends.

In most of our books we are told that twist is put into rovings for the purpose of simply holding the fibres of cotton together as it passes from one process to another. This is only half the truth. We know that if a roving is twisted too tightly it cannot be drawn as it passes through the rollers; on the other hand, if not twisted at all it will be drawn apart too easily and come from the rollers partially in tufts instead of a continuous regular length. Between the two extremes there is a degree of twist that will permit drawing, but at the same time offer sufficient resistance to it that the fibres are straightened out in the process of sliding over each other. We see therefore that the minimum of twist for holding a roving together is not the basis. What we want is the maximum of twist that

will enable the fibres to slide over each other during the drawing process in order that they are straightened out and regularity produced. Looked at from this point of view, we shall get a much more reasonable idea of the object of twist in the roving frame, and it will help us to understand much that is otherwise puzzling in poor results obtained from what have been considered good conditions.

From time immemorial there has been a tendency to simplify work by using an average and in the case of the constant mentioned above it struck somebody ages ago that a lot of trouble would be saved by using a single constant for all kinds of cotton and for different frames. This constant is 1.2, but the slightest reasoning will show that each cotton and each frame requires a different constant. For instance, American cotton on the slubbing frame must have a different constant than the same cotton on the roving frame and, moreover, the same hanks of Egyptian cotton on the same frames must have a different constant than American cotton. In general we may say that short cottons must have more twists than long cottons and that the twists per inch can be slightly increased as the roving passes from one frame to another.

Some time ago, in compiling tables of productions for flyer frames, the writer had occasion to investigate the subject of twist per inch so thoroughly that he was enabled to show conclusively that the system of using a single constant for all the frames, was not employed in a single successful concern, but at the same time it must be admitted that experiment rather than reason had dictated the twist per inch suitable in most of the mills, and there were many instances where the man in charge labored under the impression that the twists per inch were equal to the square root of the hank multiplied by 1.2 and it was only by practical proof that he would be convinced that instead of 1.2 the constant was say 1.

A table will illustrate the results of the investigation, and whilst it contains slight anomalies they represent the practical conditions of most successful Lancashire concerns.

Kind of Cotton.	Slubber.	Intermediate.	Rover.	Jack.
Indian and Low American ..	(√ hank) × 1.3	(√ hank) × 1.2	(√ hank) × 1.5	
American and Low Egyptian	(√ hank) × 1.0	(√ hank) × 1.25	(√ hank) × 1.1	(√ hank) × 0.9
Egyptian and Sea Island	(√ hank) × 0.7	(√ hank) × 0.78	(√ hank) × 1.1	(√ hank) × 0.92

Another table, published since the above, may also prove useful:

Kind of Cotton.	Slubber.	Intermediate.	Rover.	Jack.
Indian	(√ hank) × 1.3	(√ hank) × 1.2	(√ hank) × 1.35	
American	(√ hank) × 1.1	(√ hank) × 1.15	(√ hank) × 1.25	(√ hank) × 1.1
Egyptian	(√ hank) × 1.0	(√ hank) × 1.1	(√ hank) × 1.2	(√ hank) × 1.0
Sea Island.....	(√ hank) × 0.7	(√ hank) × 0.8	(√ hank) × 1.0	(√ hank) × 0.95

We see that the constant varies from 0.7 to 1.5 and the use of any number between these extremes makes a great difference in the condition of the production and also in its amount. We will illustrate this by examples later on.

(To be continued.)

The Altemus Bobbin Winder.

W. W. Altemus & Son, 2824 North Fourth Street, Philadelphia, builders of winding machines of every kind, have an improved bobbin winder to wind linen yarn from a skein, which we herewith illustrate. This machine is one of their latest productions, and is made with the usual care that characterizes the work of this concern, with every convenient device that experience has found necessary to in-

crease the production and quality of the work to be performed. The principal points of excellence in this machine are:

1. It winds a hard and perfect bobbin.

2. It gives the largest possible production.

3. It is equipped with a variable motion that imparts diversity to the yarn, and enables the yarn to be used direct from the skein.

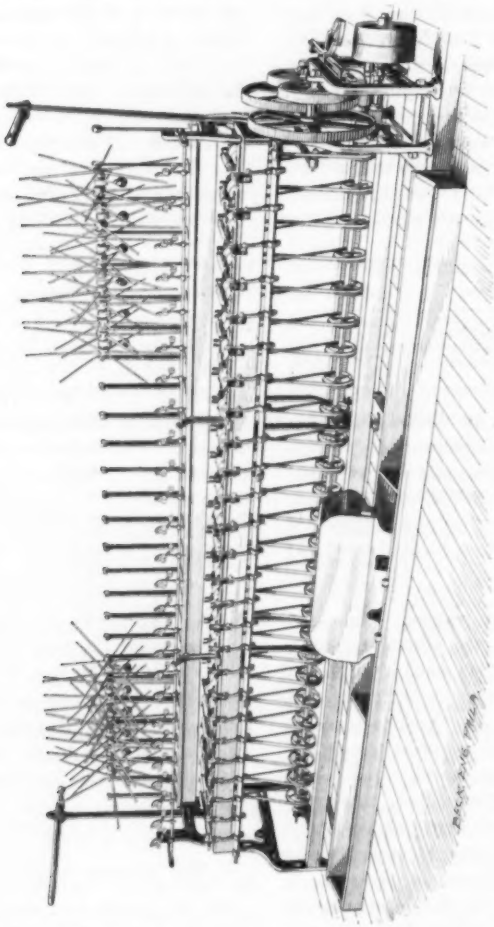
4. The increased quality of the work of the machine enables the weaving of a better and smoother cloth.

5. Its simplicity of construction makes it almost an impossibility for the machine to get out of order.

6. The machine is so constructed that there is the greatest possible economy of floor space occupied.

7. The quality and quantity of work cannot be excelled.

The shops of W. W. Altemus & Son are running to their fullest capacity, on such machines as their patented bobbin and cop-winding machines, upright quillers, upright spoolers, hosiery winders, pressure spoolers, dresser spoolers, beamers, warpers, tape warpers, tape spoolers, warp splitting, carpet rolling, chenille cutting machines, brass bobbin winders, paper-tube quillers and other machines. They have a new and improved bobbin for hosiery, to be used with equal tension from beginning to end.



THE ALTEMUS BOBBIN WINDER.

WOOLEN DEPARTMENT.

Nature of the Wool Fibre in Relation to its Textile Treatment.

CHAPTER I.

DAVID PATERSON, F. C. S.

In the present series of articles we intend to study the physical and chemical nature of the wool fibre, in special relation to the technical operations through which it must pass before being employed in the textile arts.

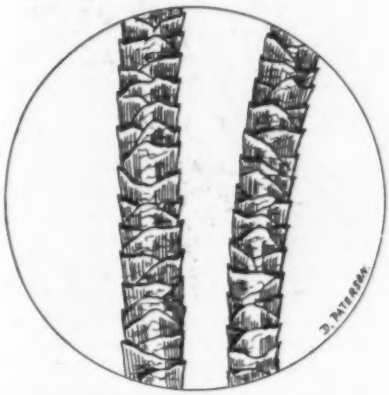


FIG. 1.

Typical Wool Fibre Under the Microscope.

There is, perhaps, no other fibre which requires so much skill in manipulation, and careful attention, as wool; and its nature being more complex than any of the vegetable fibres renders it more difficult to treat successfully. It must ever be borne in mind that, before we can reach the best results in our textile manufactures, every one engaged in the various processes must have a good idea of the nature of the materials with which they work. What we desire, therefore, is that persons engaged in the manipulation of wool, and especially the overlookers of the departments, should have a clear and intelligent understanding of the structure of the fibre, its physical and chemical properties, and its behavior under the various conditions and processes through which it has to pass. We hope, in these articles, to bring before the readers' notice, some of the more important considerations in regard to the treatment of wool.

When the wool fibre is examined under the microscope it is found to represent the appearance shown in our Figure 1, which gives a good representation of a typical wool fibre. It will be observed that it is covered with a series of thin plates or scales, somewhat irregular in shape, and arranged like the scales of a fish. This serrated appearance of the wool fibre is highly characteristic and distinguishes it from the other textile fibres such as silk, cotton, Rhea fibre, jute, linen, etc.

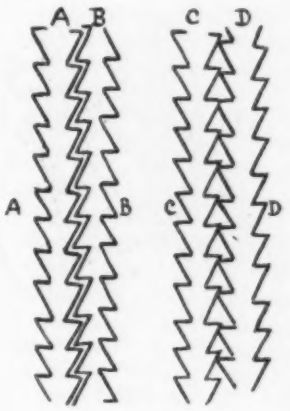


FIG. 2.

Diagram showing the Felting and Non Felting of the Wool Fibres.
A B. Felting Position.
C D. Non-Felting Position.

Though there are many distinct and well-known breeds of sheep, it is impossible to give, what we might call, a portrait of a fibre of each class, because, in sheep of the widest difference of breed are found fibres which appear identical, when examined un-

der the microscope; so that one breed of sheep might readily be mistaken for another.

The nearer the wool fibre approaches to the structure of our typical example shown in Fig. 1, it is the better fitted for all textile uses; and the further it departs from this type, the less fitted it becomes.

The rough, serrated edges of the exterior scales of the fibre play a most important part in causing the "felting" or "milling" of woolen goods, and also in the operation of dyeing, when, as it is supposed, they open their edges to admit of the coloring matters.

When the wool fibre is subjected to friction, especially in hot water with a slight quantity of alkali, these epithelial scales become readily matted and interlocked with each other. Yarns which become felted in the scouring operations are much deteriorated, as they have to be forcibly torn apart, and this naturally weakens and destroys the fibre.

It is almost impossible to get a good microscopic illustration of this felting of the wool fibre, as the fibres become so matted and interlocked with each other that they appear, under the microscope, as a great jumbled mass. In Fig. 2, however, we may show diagrammatically how this felting is caused. The two figures A and B represent, in an exaggerated form, two fibres of wool with their external scales about to become interlocked; the edges of the one fitting into the root of the other. In this way the two fibres become so firmly fixed that only by tearing them asunder can they be separated. If we examine under the microscope felted fibres so separated, we will find that their surfaces have been damaged and torn; many of the scales being torn out by the root.

The great importance of preventing felting in scouring and dyeing is well known to all; but it becomes doubly important when we see for ourselves, under the microscope, the damage which it causes to the fibres. Woolen yarns felt readier than worsted, as, in the former, the staple is short and the fibres are lying in different directions. In worsted yarns, however, the fibres are longer and are inclined all to lie more in the one direction as when growing on the sheep's back. When this is the case—see fibres C and D of Fig. 2—it will be observed that interlocking, or felting, can not take place.

This felting of wool is readily produced by using too high a temperature either in the scouring or the dye-

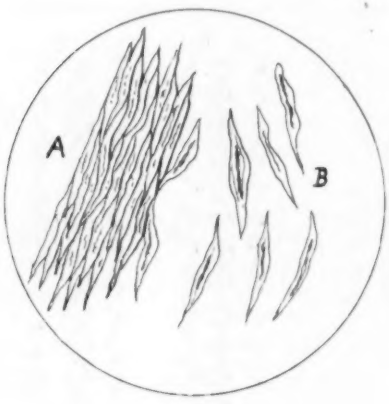


FIG. 3.

A. Cells of Wool Fibre as Seen Under the Microscope.
B. Individual Cells Separated.

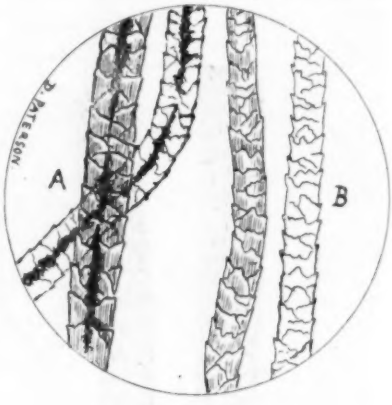


FIG. 4.

A. Wool Fibres Showing Medullary Portion.
B. Merino Wool Fibre.

ing processes, or by excessive handling of the yarn; especially in liquids which are slightly acid, as in dyeing, or slightly alkaline, as in scouring. Dilute acids, as we shall observe later on, have the property of opening up these exterior scales of the wool, giving it a more serrated appearance under the microscope. The scales being opened, dye solutions can enter into the interior of the fibre better and there become fixed, or permanently dyed, within the wool. Hence the value of the addition of acid to the dyebath.

But, before studying the question of dyeing of the wool fibre, let us consider further the structure of the wool itself. Under the outside sheath, or cuticle, with the overlapping scales, which we have just considered, is the cortical substance of the fibre itself, upon which depends the elasticity and color of the wool.

This substance consists of almost innumerable minute cells all tightly bundled together. By treating the wool with suitable chemical reagents —strong sulphuric acid for example— these masses of spindle shaped cells can be separated and examined under the microscope. They are found to be long and tapering in shape, ending in a fine point at each end. Figure 3 gives a fair representation of these cells (A), bundled together as they are in the fibre; and B shows a few separated individual cells. We have said these cells are almost innumerable, because our great authority on the wool fibre, Dr. F. H. Bowman, to whom we owe our present knowledge of the internal structure of wool, has had the patience and industry to count them, and he tells us that in a cross section of the fibre may be counted over 1500 cells. He has also counted the exterior scales and gives their number at about 6000 per inch of wool fibre. This cellular substance of the wool is what we might term the marrow of the wool fibre, as it constitutes nearly the whole of the inside portion of the fibre.

In many specimens of the wool fibre there is a third part, i. e., a central or medullary portion, which, when present, may run through the whole length of the fibre, or only appear in detached portions (see A, Fig. 4). It has been found, however, that wool which exhibits this third or medullary portion is generally stiff and more of a hairy nature, not so well adapted for the ordinary purposes of textile manufacture. The finest wool, namely, merino, does not show any core or central medullary cells; see (B) Fig. 4.

It is interesting to mention, in passing, that these spindle-shaped cells (Fig. 3) have a much greater affinity for dyes and coloring matters than the external scales. As we have already stated, the effect of adding acid to the dyebath and of mordanting the wool, is to open the external scales and admit the dye solution to these cortical cells, which have the necessary affinity for the dyestuffs.

Wool which has been "extracted" or "carbonized" (i. e., woolen stuffs mixed with cotton, which have been treated with sulphuric acid to remove the cotton) is found to dye a much deeper shade than ordinary wool, for this same reason. Having now considered briefly the outstanding points of interest in the physical structure of the wool fibre, we hope to study in our next chapter some of its physical and chemical qualities.

(To be continued.)

Wool Imports Under the 1816 Tariff.

Statistics of the imports into the United States during the fiscal years 1816, 1817 and 1818, of raw wool, dutiable at fifteen per cent., as an unenumerated article, are not to be obtained. Probably very little wool was imported during these years, judging from the fact that in the first year of the record of raw wool imports, the fiscal year of 1822, they amounted to only 1,715,690 pounds, valued at $387,126.

Spinning Wool in a Wet State.

BY S. B. H.

The greatest disadvantage of an insufficient cleaning of the material before oiling, picking, and carding, can be stated in a few words: First, the dirt and dust left in the wool will absorb part of the lubricant, and diminish the beneficial effect of the latter upon the fibre. The mixture of dirt and oil is a sure means of clogging the card clothing, and thereby deteriorating the effect of carding. Not alone is the clothing gummed up and rendered unserviceable for an effective operation, but the material is also glued together, in which condition it is difficult to smooth and lay it straight in the card, and it remains sticking everywhere to the working surfaces of the engine. The doffing of the lap is also rendered difficult. Next, it requires more labor and detergents to cleanse the yarn and cloth, while at the same time the operation presents many serious difficulties.

A frequent cleaning of the machinery is required, which entails a loss of time and diminution in production. There is much waste, and uneven and lean yarn. This, also, as well as the cloth, becomes boardlike when washed, and calls for the employment of stronger lyes. These are the natural consequences of an insufficient cleaning of the wool before carding and spinning; they present a further argument against the working of the material in a wet condition, because it stands to reason that the dusting of the wet wool is out of the question.

Only after a thorough cleaning and dusting of the dry material should it be lubricated. The object of this is to make the fibre pliable and yielding to a certain degree, so that it can more readily be smoothed and laid in the carding and spinning processes. The quality of the lubricating material is a matter of great importance, and two circumstances especially must be considered in its choice; first, its adaptability for spinning purposes; and, second, its behavior in washing and milling; that is, the cleansing of the yarn or cloth.

A lubricant for wool or spinning purposes must be of a superior quality in order to make the fibre pliable. Numerous "wool lubricants and compositions" are at present found in commerce which contain oil only in homeopathic doses, but in place of it aqueous solutions of alkalies and decoctions of various kinds. All are ill adapted for softening the fibre; in fact, they have the opposite effect. The small pecuniary benefit resulting from the purchase of such cheap substitutes (for they are all cheap, a fact which should make the purchaser suspicious) is counterbalanced by the trouble and inconvenience experienced in spinning and milling the manufactured goods, which, in fact, contribute to make them doubly dear.

Wool requires a certain percentage of good oil for spinning. Above all things, it should not become resinous, which is the case with most vegetable oils, and which make the wool sticky, the carding more or less imperfect, and the yarn hard and stiff. The vegetable oils used formerly,—for instance, olive oil and rape seed oil, especially the latter,—had this defect. Yarn spun with good oil can be stored for some time without becoming sticky or stiff. Although the animal fat called oleine, which is now being very extensively used, does not show this tendency, still it is generally acid, especially the cheaper kinds, in consequence of which it wears the card clothing. Good oleine, however, contains so little acid that its influence upon the card teeth is barely noticeable. It can safely be asserted that oleine, provided it is pure, and not adulterated with mineral oil, as it often is, is the best lubricant, as it saponifies very readily. It saponifies with weak, cold soda lye easier than any other oil. Its other qualities, especially its large percentage of fat, make it very suitable for the spinning mill, so that the few disadvantages it possesses are hardly worth consid-

ering. Mineral oil cannot be considered as a wool lubricant, although it is not changed in the least by oxygen, does not become resinous, nor is it inclined to spontaneous combustion, like many other oils, but it is unsaponifiable, an objection which more than counterbalances all its other merits. Next to oleine, olive oil may claim to be the most suitable lubricant.

The percentage of lubricant required varies according to the character and purity of the wool material, and ranges between 10 and 15 per cent. In order to divide the oil more equally and to heighten its effectiveness, it is often mixed with urine, the quantity of which also varies according to the degree of dryness and fineness of the material. Besides this, the addition of an alkali may also be added for the purpose of effecting a better saponification in washing. The use of soap as a binder is not to be recommended, because the lubricant is apt to become stiff and smeary. When working the wool in a wet condition, it is difficult to ascertain the mixing proportions of the lubricant.

After the wool has been freed from dust and dirt, it is first passed once while dry through the picker, so as to be opened and mixed uniformly. It is then piled in layers and the lubricating agent poured over it. Then it is beaten with sticks or wooden forks, so as to accelerate the distribution and penetration of the lubricant, and then, according to circumstances, passed once or several times through the picker. On account of its usefulness, the picker has become a favorite machine in spinning mills, in fact it cannot be dispensed with by any mill. It is suited for mixing oiled wool better than any other, and the excellent quality of the work is everywhere recognized. For the mixing as well as blending of different kinds of wool, several passages through the machine are advisable, in order to obtain a thorough blending of the material, as well as uniform division of the oil. In the manufacture of mixed goods, every lot of the compound should be picked separately, especially when it is to be used for filling. Several pickings are highly advisable, not only for mixed goods, but also for single colored ones.

The above described, rather primitive style of oiling is still in use in many mills, and if conscientiously performed is sufficient to effect an equal distribution of the lubricant. More recently, however, so-called oiling pickers of various construction have been introduced, by which the equal blending of the wool is made more easy. These machines generally apply the oil with a rotating brush, which, either moving within a receptacle, takes up the necessary quantity of oil and sprinkles it over the wool, or else works underneath a sieve-bottomed basin, where it receives the oil and surrenders it to the wool. The speed at which the material moves, and the quantity of lubricant taken by the brush, can be regulated at pleasure.

It is not advisable to oil and pick too much material at one time, as it does not improve its quality to allow it to remain for any length of time before being worked up. There are many reasons for this. First, by the storing of the wool the lubricant will draw away from some portions and settle in others; some portions, which are more exposed to the influence of temperature, will dry out more or less; again, lubricated wool, when stored for some time, is apt to become tough and sticky, thereby rendering an effective carding difficult; finally, the fibre is softened unnecessarily, and the objections mentioned when treating of wet wool, arise. When, however, there are good reasons for lubricating a large quantity of wool at one time, the excess should be stored in a cool but dry room.

—It is important that every care and attention be given to the treatment of cotton goods preparatory to the dyeing process.

Jottings on Carbonization.

The process of carbonizing woolen fabrics is now so well known and so commonly practiced that it scarcely needs exhaustive explanation and detail of description. Nevertheless, it is a process so important, and so delicate in many ways that it is well to be on the lookout for dangers, and always alert to learn new methods that may lead to safer and surer results.

The main principle of the operation is simple and beautiful. In fact, one of the features that often strikes us as we think of the various processes of manufacture when reduced to their lowest terms, is just this beauty and simplicity of the basic principles on which they are founded.

In carbonizing the foreign particles that adhere in wool and wool textures, the thing we must do is first treat the particles so that they can be removed, and secondly, remove them. The particles themselves untreated are so tightly fastened into the texture of the cloth that it takes a violent pull to get them out, and this can only be done where they are large enough to see and of such a nature as to be handled. Many of the particles that destroy the value and good appearance of a woolen fabric are so small as to be scarcely evident in the unfinished piece, but when the cloth is ready for the market then they become apparent.

What an extremely happy thought it was then when some fortunate observer or experimenter conceived the idea of treating the cloth with some chemical substance, that, while it would not touch or harm the wool fibre proper, would have the effect of disintegrating and pulverizing the obnoxious particle. Once the particle is pulverized, a good shaking will remove it from the dried textile and all is well, without any tearing of fibres or perhaps making of a hole in the fabric where the particle is removed.

This essentially is carbonizing. But in the practical application of the process, there are many points that must be noted and well attended to, or the work will be fraught with danger and risk.

If the acid employed is not of the right kind or in the correct condition, it will impair the strength and elasticity of the fibre and have a bad effect on all the subsequent work of the manufacture. When sulphuric acid is used an acid strength of three per cent. in all cases is quite sufficient. If sodium bisulphate is used, the bath must not contain more than five per cent. of weight of the chemical. Where chloride of magnesium is used, you can go as high as ten per cent. and yet not be in danger of disastrous results. The different materials employed must be right as to quantity and strength or trouble will surely result. Chloride of aluminum has been suggested as a carbonizing agent, but the great difficulty with this substance is that a deposit is formed in the shape of a hydrate upon the surface of the cloth or fibre, and this deposit is very hard to remove. It also has an uncertain action on some of the colorings and cannot always be depended upon with certainty.

Another item is the matter of how long a time various kinds and weights of fabrics should be subjected to the carbonizing bath. If working on a light cloth and on a heavy one, we would naturally think that a stronger acid bath ought to be employed in the latter case than in the former. But this is not so. The same bath will answer in both cases, but the secret of success in both cases is to keep the heavy cloth in immersion a longer time than the light, and admit of perfect and thorough saturation. If the bath is correct, it does no harm when the goods are subjected to it for a considerable length of time.

The temperature at which we use the acid is another point of interest. It is to the advantage of safety to employ a weak acid at a high temperature, rather than a strong acid at a low temperature. A temperature of 100 degrees C. is safe and all right with sulphuric acid or bisulphate. If

chloride of magnesia is used, it will be necessary to go as high as 130 degrees C. For a good white, bisulphate of soda will be found preferable. The chlorides tend to turn colors gray and dull.

In carbonizing a cloth it is not hard to get things into such shape that stains will be produced, or that the cloth will be made tender in spots and wear. But one item that will go a long way towards the prevention of these results is to see that the cloth is perfectly dry before it is placed in the carbonizing stove. If the acid is left in any proportion in the cloth in a moist condition, so that it can gravitate or collect in some places more than at others, then we must have a care or stains and tenderness will follow. Some carbonizing machines allow the cloth to hang during the process, others permit of its being moved all the time during the process. It is needless to say that the latter are much less apt to have the effects above described than the former.

If the goods that are carbonized have got to be washed in soda, it will not do to use water first and then the alkali; but the alkali must be used at once, and not preceded by the water. In the last results the bath that is employed must be liberal and must be always cool. It won't do to employ ammonia and it won't do to allow water drops to appear anywhere on the goods. They will generate heat and injure the fabric.

It is well to know that if sulphuric acid or bisulphate are used, the felting capacity of the wool fibre is not only uninjured, but it is actually increased. On the other hand, if any substance is used that causes the formation of hydrochloric acid, the action on the felting capacity is not going to be satisfactory.

MANUFACTURER.

—The Italian markets are less favorable to English goods, as the result of increased tariffs; but the check upon trade applies more to goods of inferior quality than to those of the finer class.

Finish of English Woolens.

By special request, the United States consul at Bradford, England, has written a communication to the State Department, Washington, on the treatment and finish of English wool fabrics, in which he gives many points of interest to those engaged in the manufacture of woolens. The consul commences his report with an acknowledgment of the fact that one of the strongest features in the popularity of woolen fabrics made at Bradford is their excellence of finish, though this is not confined to any recent years as the consul intimates, but one which has always characterized Bradford goods, though great progress has undoubtedly been made these last two or three years in this respect, for the purpose of compelling trade with the United States by overcoming the tariff restrictions of this country on all manufactures of wool. Bradford manufacturers seem to realize that the only way to retain the American trade is to improve the appearance of their goods, which they have done, making some of their poorest fabrics look like the best, and the consul refers to the present condition of trade in his district as a fair commentary on British energy and push. An English expert is reported as having said that one of the principal deficiencies in American made textiles is the finish, wherein the goods lack that soft, clothy handle so peculiar to Bradford products.

The consul reports that in his opinion there is no doubt that "handle" is the prime factor in the finish of all Bradford-made textiles. It does not matter what class of finish is required, this is never lost sight of. The principal criticism which Bradford finishers make of American textiles is that the nature and weave of the cloth are not considered as they should be. The American fabrics, they say, appear to be too roughly and strongly handled while being finished. The vitality of the wool is considerably reduced; as one expert says, it is

"done to death." The principal features in any marketable cloth due to the application of finish are a soft, full handle, a compact texture, a permanent luster, and firmness, combined with solidity.

Climatic conditions favor England. The atmosphere of England is damp, and this, it is well known, feeds the wool fibre, wool being very hygroscopic in its nature, readily absorbing moisture from the atmosphere and retaining it with considerable tenacity. In the various processes of manufacture, much, all, as the Consul writes, the moisture is removed from the wool fibre; and when the woven fabric comes to be finished, it is the work of the finisher to restore it to its original state. But practical men in England say that American finishers of textiles forget this important truth—that wool when woven into a piece can be easily and permanently spoiled, and when once spoiled it can never be restored to its natural state. This can be done in many ways; for instance, by finishing at too high a temperature, artificial heat—especially when the natural moisture of the fabric has been evaporated—playing a very destructive part in reducing the softness of the fabric. Too much attention cannot be paid to singeing and hot pressing all fabrics, for with the natural dry atmosphere of the United States—the very opposite of that obtaining in England—these points should be especially watched.

In the treatment of woolen fabrics, most English manufacturers have special processes of their own. In ordinary worsted coatings, for instance, the procedure in dyeing and finishing is as follows:

The pieces are first "crabbed"—i. e., scoured in boiling water containing soda or alkali—to remove all the oil and grease which may be in the piece; then they are steam blown for some five or six hours, and allowed to stand on a gauntry until cold. This is followed by a further process of scouring in a "dolly," the water being afterward wrung out by a hydro-extractor. They are then dried over a cylinder drying machine and dyed. This process is succeeded by washing through cold water for cleansing, and then they are slightly steamed again. For "navy blues" they are dollied in fuller's earth, for the purpose of making them soft, and then rewashed, the water being extracted in a hydro-extractor. They are then dried over a hot-air drying machine, the selvage only coming in contact with the machine, cropped in a cutting or shearing machine, and brushed. If a nap is required, they are "teazled." If the cloth is found to be too dry, it is run through a "dewing" machine and damped again to the extent required. After this, the two ends of the piece are placed face to face and folded, warm press paper being inserted between the cuttles or folds, and placed in a hydraulic press. The paper, heat, and weight vary according to the finish desired. The fabrics are then passed through a steaming machine, where all the finish marking is taken off, the face side being towards the steam, and afterwards cuttle folded—face sides together—and placed in a cramp, where they are allowed to remain for several hours.

For a "botany" worsted, the process varies slightly, according to the finish required. The fabrics are first scoured through a dolly machine in hot water, etc., and rinsed in cold water. They are also subject to milling, require more press finish, and take more weight in this process than ordinary worsteds.

It may be here pointed out that one of the main factors in securing the superior appearance is the treatment the pieces receive in the steaming process and the subsequent press finish.

Linings (beatrices, etc.) are first crabbed through hot water—of which they cannot have too much—and boiled for four hours. (The steaming process here would make them tender.) They are then taken over a

cylinder drying machine and dried, then over a hot plate and slightly singed, and afterwards brushed and dyed. When this process is completed, they are washed and dried, singed again, washed again, dried, and pressed in a hot pressing machine, this latter being repeated—the finer the pieces the lighter the treatment throughout.

Dress goods (such as lusters, mohairs, wool figures, etc.) are as a rule dealt with in the following manner:

They are crabbed, steam blown to set, allowed to stand over night, dried, singed, passed through a four or five hole squeezer and scourer to give polish and finish, and dyed. If the piece comes up dull, it is run through soap and water, singed again, and pressed. If water marked, it is passed through the five-hole squeezer and washed. Light shades are not crabbed, but stoved with brimstone, which gives a finish, then scoured to remove the smell. Creams are singed over a copper plate. Mohairs are pressed lightly, with little heat.

Seeing that the question of soft "handle" is so imperative with American manufacturers, it may be well to call attention to an old method of finishing in Yorkshire, which is still in use today and is found advantageous. This is done by the old dewing machine, the object of which is to remove the harsh feel caused by the tentering and pressing operations, and to impart to the cloth a full and soft handle. In order to effect this, an imperceptible film of water is thrown onto the piece, varying in quantity from one-fourth of a pound to six pounds, according to the character and nature of the fabric.

Chemical Action of Soap.

We have not yet a full knowledge of the chemical action which goes on in washing. It has been asserted on the one hand that it takes the form of a neutralization of fatty acid by the free alkali in the soap; on the other that a mechanical emulsion is formed with the grease of the dirt. The neutral salts in the soap, it was thought, decompose in cold water into acid salts and free alkali. The former form an emulsion with any fats present. The fatal objection to this theory is that hot soap solutions are more effectual than cold. Persoz and others assert that the soap does not decompose in hot water, but forms alkaline salts with cold water, that the latter saponify fats and make them soluble in water, that acid salts are also formed which prevent the saponified fats from precipitating on the fibres. Rotondi has dialized soap solutions of various strengths, and asserts that basic and acid salts are formed whether the water is cold or hot, the acid salts being insoluble in cold and only slightly soluble in hot water. The basic salts, however, are completely soluble in cold water, from which it can be precipitated by common salt. With fats the basic salts give a clear solution and act as solvents for the acid salts when hot, although the solution becomes turbid on cooling. This he says is the reason why ordinary soaps dissolve completely in hot water. In spite of the decomposition they undergo, the basic salts emulsify fats but do not saponify them. The acid salts do not emulsify, and hence water containing carbonic acid is unsuitable for washing purposes. Rotondi thus shows how soaps of apparently similar composition may act differently, as they may form different proportions of basic and acid salts.

—Henry P. Wilmarth, Attleboro, Mass., has taken up angora goat husbandry quite earnestly, and has stocked his farm with 400 of these animals, 200 of them having been received the latter part of last month, and said to be in good condition, having come from the stock farm of C. P. Bailey, San Jose, Cal. It took two months for them to reach their destination from California.

KNITTING DEPARTMENT.

The Knit Goods Situation.

The decided tendency toward a let-up in business is not to be accounted for entirely on the ground of the halting spring. The liberal buying that has prevailed for many months is beginning to be felt. In short, the trade is liberally stocked, particularly with underwear, and it has been well said that but for the long time scarcity of yarns, dealers would be heavily overloaded.

At this juncture it is interesting to note what appears as over-confidence on the part of the officers of several trade associations, who explain in part the present lull by the theory that knitters are buying only for immediate needs, in the hope of breaking prices; also by saying that commission men are attempting manipulation. The yarn spinners' organizations, in the meantime, are marking up quotations.

Notwithstanding such hypotheses, domestic manufacturers' deliveries are so rapidly increasing that jobbers have ceased to attempt to push them forward, as for a long period. Indeed, they would like to push them backward in many instances.

Nobody knows the exact situation, but the tenor of reports received from the road indicates that enough winter goods are held in stock to seriously cut into the fall demand. The early business in underwear, which is always the largest, if not the best, was in great measure lost by the protracted fall temperatures. Dealers were in hopes to make up something of this loss by getting better prices after cold weather came, but the premiums generally derived were insignificant.

The conservative element is not to be deceived as to actual conditions by emphasizing the position of wool and cotton, which, while they can delay, cannot prevent a general sagging in prices.

It remains to be seen how much profit on goods long ordered retailers will deliberately surrender to the public. Of course, the recent slump in raw wool has extinguished the foolish talk of higher figures on duplicate orders in certain lines.

Two or three of the underwear departments are in extra strong shape. This is particularly true of fancies, such as random and cross-over stripes and checks on ecru ground; of balbriggans, especially in low to medium grades; of novel light-weights, such as mesh designs, and of fine goods for men's trade, which get more easily tangled than women's goods.

Underwear importers are not complaining. Their fall orders, not yet complete, promise to be somewhat in excess of last year, in spite of the mild winter just passed. They are catching up in their deliveries, although still very busy.

Relatively speaking, hosiery men, particularly importers, have been much better occupied, of late, than the underwear branch. Prices abroad are still more than steady. Buyers in Chemnitz continue to hesitate at the prices demanded, but they all end by buying thereat, being fearful over prospect in delay of deliveries. Coal is rising in Germany, along with wages and raw materials, and it is generally conceded that further advance is extremely probable.

Substitution is possible, temporarily, at least, for certain Chemnitz staples but not for Chemnitz fancies.

Indications point to a small-sized famine in split feet, if the present pace continues. The premium on these goods is steadily widening abroad, while domestic split feet are in increasing request.

Red and blue are the prevailing colors in hosiery for fall orders, and naturally, for the printed effects and

extracted patterns are best brought out in those shades.

Full-fashioned goods manufacturers are, relatively speaking, busy with little slackening in demand visible. They feel that their position is materially strengthened by the strong situation in Germany.

Fleeced hosiery is very lazy, as might be expected after such a mild winter. Nothing short of two or three severe seasons in succession will cause a return to the demand of a few years since.

Prices of Hosiery Yarn.

The Southern Hosiery Yarn Spinners' Association met at Charlotte, N. C., last month. The meeting was presided over by President Charles Adamson. Among the commission men present were Alex. Mitchell, of James E. Mitchell & Co., Philadelphia; William A. Spellessey and F. W. D. Oliver, of William D. Oliver & Co., Philadelphia, and E. S. Hyde, of E. S. Hyde & Co., Philadelphia.

The following schedule of prices was adopted: Fives and 6s, 17 cents; 7s and 8s, 17½ cents; 9s, 17¾ cents; 10s, 18 cents; 11s to 22s rise three-eighths cents per number; 23s to 40s rise one-half cent per number. This makes 20s 21¼ cents; 22s, 22 cents; 26s, 24 cents, and 30s, 26 cents.

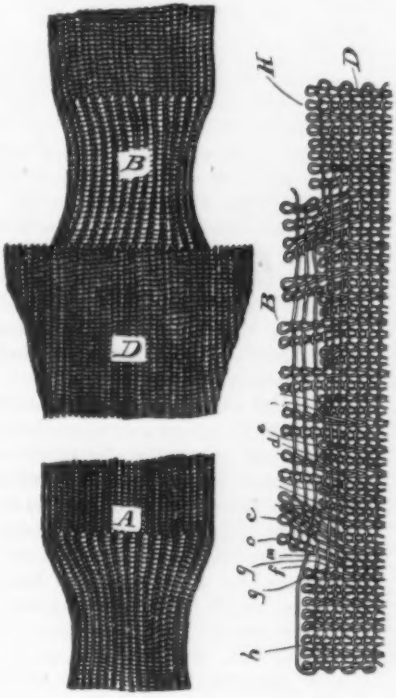
The mills have agreed to discontinue the payment of "second freights," and in future will pay freight to either Philadelphia, New York or Boston, or if shipped direct to customers to whatever city in the East the customer may desire.

The officers of the association stated that it was not the purpose in discussing the schedule of prices to undertake to stimulate prices further, but only to bring the schedule in accordance with the actual markets.

The subject of a uniform contract to be used by the commission men in dealing with the users of the hosiery yarn was taken up. The purpose in undertaking to formulate a uniform contract was to get a contract that both sides would have to keep. It was claimed that the purchasers of the yarn in many cases repudiate their orders when it is to their advantage to do so, but on the other hand they hold the mill to a strict enforcement of the contract when it is to their interest. The subject of commission men buying or acting as dealers when they were supposed to be acting as commission men was talked over.

Close and Open Knitted Fabrics.

We illustrate, herewith, a new idea of knitting fabrics, having certain portions knitted comparatively close and certain other portions knitted



comparatively open, the comparatively-open work being secured by discontinuing some of the wales which had been contined through the comparatively-close-knitted work.

In the knitting operation, especially when practiced on a knitting-machine, it has been found difficult to produce a garment of the above type without

laboriously transferring the last stitch of the discontinued wales to the needles employed in knitting the wales which are to be continued through the more open work, for the reason that the tension upon the frabric as formed would pull out the stitches of the discontinued wales.

The present object is to provide a fabric in which this tendency to draw out or ravel the stitches is obviated; and it consists, broadly, in a fabric in which the last stitch of such of the intermediate wales as are discontinued is without direct connection with the wales which are continued, so that the tension as applied to the latter wales is not thrown upon the stitches of those wales which have been discontinued.

The improvement is applicable to any form of garment or fabric in which such comparatively open and close knitted work is present.

For the purpose of illustrating, we show a series of undershirt-sleeves as they come from the knitting-machine, wherein the close-knitted work is the body and upper portion of the sleeve and the open-knitted work forms its cuff, the intermediate portions being broken out to bring the figure within the limits of our space; also a detailed elevation upon an enlarged scale.

The wales discontinued in changing from the close to the more-open knitted work are dropped at the juncture of the upper end of one sleeve with the cuff of the next. In the article as shown the cuff portions are indicated at A B and the body or close-knitted portion of the sleeves at D. Inasmuch as the cuff is of less width than the upper end of the sleeve there is shown at each side a lateral projection or shoulder H h, and the wales of these portions are continued beyond the line at which the fabric will be separated for the purpose of working it into complete sleeves, so that several of the last stitches of these wales may be drawn out by the tension upon the fabric as the knitting operation proceeds without detriment to the fabric.

At b c are shown wales which are continued from the close-knitted work of the upper portion of one sleeve to the open-knitted work of the cuff portion of the next sleeve, and the yarn leads directly from the last stitch formed at the edge of the shoulder h back to the first of the wales b, to be continued into the cuff portion B.

At d e are shown the last stitches of intermediate wales which are discontinued at the upper end of the sleeve, and it will be seen that these stitches as well as the stitches next preceding them in the same wales, are not directly connected with the stitches of the wales which are continued into the cuff portion; but the direct connection is with the next discontinued wale or with the first wales in the shoulder portions H h. The strand of yarn forming the connection between the stitches d e, which are separated by continued wales, is shown at g g.

As will be readily understood by those skilled in the art, certain stitches as m, of the wales which are continued into the cuff are held upon their needles, while the last two stitches of the discontinued wales are formed so that the tension upon the fabric is largely upon the stitches thus held and is sustained by them and their successors in the same wales after the stitches d e have been cast off, and inasmuch as there is no direct connection between the wales continued into the cuff and these cast-off stitches there is no strain applied to the latter to draw them out.

Elasticity in Underwear.

My object in writing on this subject once again is to say that in the manufacturing of knit underwear, as in all other businesses, no set laws can be followed with absolute rigidity, yet they must be observed to some extent, and always to the extent that the two extremes must be avoided. The knitter should know when his cloth is too stiff and inflexible, lacking the required elasticity, and when it is too soft and unstable. He should avoid falling into

either of these errors. It is the knitter's duty to find the two extremes, and exercise his judgment to find the mean between the two, so that the cloth, when knit, will meet the required elasticity, and be suitable for the trade. All styles and grades of knit underwear were never nicer, never so neat, and never better made than they have been the past season.

Some years ago manufacturers used material so indiscriminately that it fell into disgrace for years. Of cheap shoddy garments, none need expect any elasticity, unless the yarn is twisted extremely hard, which will make it kinky and almost impossible to knit, especially on spring needle machines; and what is gained, as some may think, one way, is lost in another by an overproduction of seconds. Some manufacturers, in order to economize, have used shoddy to such an extent, that they have overloaded the fabric, and nearly ruined it.

Three points should be remembered, good quality, proper quantity, and intelligent mixing. Better the grades of shoddy, greater the quantity may be used; but remember, the garments will felt more readily and all elasticity killed. In order to produce a garment to undersell another, a poorer quality of stock may be used, but when the goods are washed they will be thin and sleazy, for a large amount of stock is lost in scouring, and not a whit of elasticity remains.

Manufacturers of underwear, who use much shoddy, especially of the lower grades, should remember that the low priced stock is made from questionable rags, which may contain more or less cotton. Wool is the only felting material known, and hair felts only in proportion as it partakes of the nature of wool. It is of the utmost importance for manufacturers when buying wool, to be very particular as to the quality they purchase, as it has a great deal to do with the elasticity required of the garments.

I'll relate an instance which happened to me a few years ago. The party by whom I was employed, was desirous of having a few nice, fine garments made, so some beautiful Australian lamb's wool was purchased at 84 cents per pound. It carded well, spun beautifully, and knitted A 1. But in scouring the greatest precaution was necessary to prevent felting and destroying the elasticity of the goods.

ANDREW SCOTLAND.

Too Small a Plant.

In recent issues of the Textile World, the question of the cost of seamless hosiery has been discussed at considerable length, and the opinion was expressed by a number of correspondents that a plant for 50 dozen per day was too small to do business profitably. An instance has recently come to our attention, which has a direct bearing on this question.

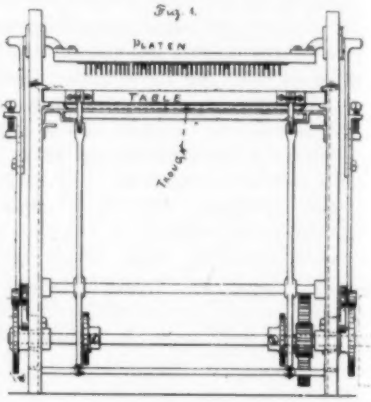
A small plant in Pennsylvania, which has only been in operation for a short time and which was thoroughly equipped with new machinery of good pattern and managed by an expert knitter, has decided to discontinue business because their experience convinces them that such a small plant cannot be made profitable. Our correspondent writes: "Our goods have been O. K. from the start, not having had a single pair of hose returned from any cause; in fact, the goods have been very favorably commented upon, but competition is so keen that the margin of profit is extremely small, and I am convinced that a plant making 50 dozen per day is simply not in it."

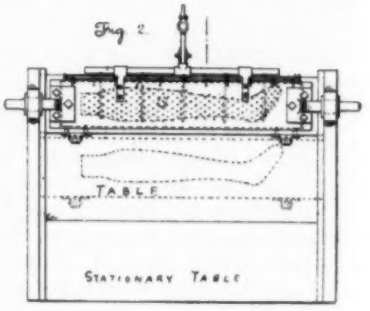
This particular case was one which might have been slightly altered had the manufacturer been his own superintendent, but this plant was expected to pay a fair salary to a practical superintendent and also yield a dividend on the investment of the owner, and the product was not large enough to do it.

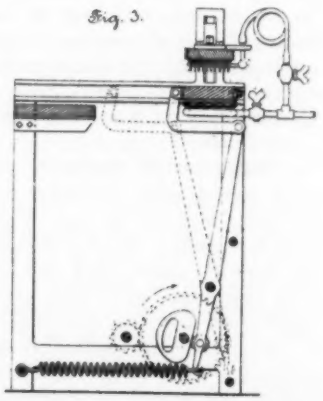
Polka Dots.

Mechanical devices and apparatus are now being designed with considerable frequency for the production of fancy effects in knitting and upon knit goods. A machine has been designed for producing polka dots, or any other design or figure on dyed, knit or other fabric. Heretofore the polka dots or other design on knit fabric—for instance, on stockings—have been produced by applying by hand-operated stamping devices wax dots in the shape desired to the undyed fabric. The latter was then dyed in any preferred manner and the wax removed by heating, washing, etc., of the dyed fabric. Great difficulty is, however, experienced in obtaining good results with these hand-operated devices, as the dots or other design will not be of such uniform size or distinction as is desirable, and it has been found that this only can be had when the pressure exerted on the platen applying the wax or other suitable material is at all times the same and the wax or other material is always in the same liquid state when applied to the goods. With this machine, which is power-driven, these difficulties are not only overcome, but cheapen the goods, as the machine is capable of turning out five times the goods that could be done by the hand-operated devices. This machine is also adapted to apply a hot dye by heated forms or molds to a fabric in such a way that the design is directly printed onto the goods desired to be ornamented.

Our readers may be interested sufficiently in such a machine as this to desire its illustration, which we give in connection with this article. Figure 1 is a front elevation of the machine embodying the invention, having as principal features a movable table supporting the fabric to be operated upon, a movable platen carrying the heated mold, and a trough for containing and heating the liquid or wax to be applied to the fabric. Figure 2 is a top view of the machine, showing a stocking, and a movable table, to be provided with polka dots, from pins secured in the platen forming the mold. Figure 3 is a cross section of the machine, easily understood.







The platen is vertically reciprocated by a set of cams, and is provided on its under face with a mold, or design, composed of pins fastened to a metal

plate, which is removably fastened to the platen in any preferable manner and for the purpose of changing the design, if desired.

Below the movable table is secured a trough, in which the material—wax or dye—to be applied by the pins to the goods supported on the table is contained. The trough and its contents are kept in a heated state by a suitable heating appliance.

To avoid the clogging of wax or other material on the pins, constituting the sign or mold of the platen, a heating appliance is provided and comprises a number of perforated gas-pipes, located between the pins. See Fig. 3.

The operation of the machine is as follows: The goods to be ornamented are placed on the table when the same is near the stationary table, the pins of the platen in this position being immersed in the contents of the trough. The platen now rising to its highest position, the table, with the goods, moves in the position shown in Fig. 3, when the platen descends sufficiently to make an impression on the goods, after which it ascends, and the table moves toward the stationary table again, while the platen descends to again immerse its pins into the contents of the trough.

New Ideas in Knitting.

Devices have recently been invented, intended for application to machines for knitting ribbed fabrics, although in some respects applicable to other machines. The object of this is to provide for the secure confinement to the rotating wheel, whereby they are operated, of the segments of the ring carrying the cams which actuate the needles of the cylinder, a further object being to simplify the construction of the devices employed for moving the cams of the dial cam-plate so as to provide for the formation of tuck or welt stitches.

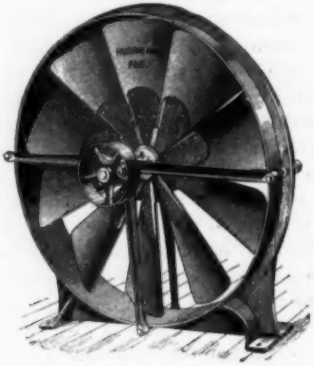
A mechanism has recently been designed to knit figured fabrics by the employment of a plurality of sets of knitting cams, various colored yarns, and the operation of the needles in a predetermined order. The object of this is to provide improved means for effecting the raising and lowering of the cam-levers, which in the revolution of the cam-cylinder raise the pickers, which in turn raise the needles out of the path of the needle-operating cams.

New mechanical means have been devised for circular knitting machines, for feeding a plurality of threads to the needles, to produce striped or reinforced work, in which the threads thrown out of work remain attached to the inner side of the tubular fabric. The idea is to provide means for taking care of the threads which are out of work and which in the continued revolution of the machine become twisted and entangled, tending to draw the fabric up through the cylinder and interfering with the successful working of the needles and also drawing and distorting the loops of the fabric where the threads are attached to it or breaking the thread away from the fabric in the case of tender yarn. The mechanism is designed to obviate these difficulties and defects by providing a thread-engaging device which in the revolution of the machine engages the loosely attached inactive thread and draws it to the centre of the cylinder, where it is held, so as to prevent it from interfering with the work.

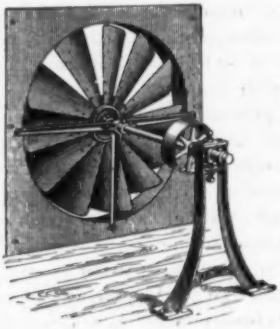
A new arrangement has been designed for making tubular goods, and especially to make stockings, in which a plurality of thread-carriers are used not all of which are in action at the same time. The means employed consist in providing for the retention of the idle threads used in the formation of a tubular fabric in which a plurality of threads are used, some of which are at times idle.

There has been invented in Italy, which is also the subject of a patent in this country, a device for producing knitted goods of plain or fancy design, adapted to and operated by a sewing

machine. The object of the invention is to combine with a sewing-machine a reciprocating comb, a knitting-needle, and means for forming loops, a loop-catcher for catching the loops so formed and placing them on the teeth of the comb, and a loop-lifter for stripping the completed loops from the comb to be replaced by newly-formed loops.



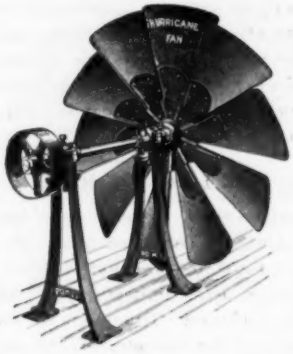
Improvements have been made in knitting machines, which have for their object that of increasing the capacity of the machines for doing a great variety of work with a small outlay of time, especially in producing goods having checked surfaces or for producing figures or leaves, flowers, or other de-



signs in knitted fabrics. They consist in providing a knitting-machine, having suitable needles and guides therefor, with one or more adjustable cams, whereby at a predetermined time the cams can be thrown out of engagement with the needles, so that a different stitch will be produced. By manipulating the needles of a knitting-machine in different ways at different points the operation of the needles can be so effected as to produce fabrics having different stitches and in such a way as to produce figured fabrics or such as have designs or configurations formed upon them by the difference in the stitch of one part from that of the rest of the fabric. Some knitting-machines employ needles having long and short heels for producing plain or ribbed fabrics, while this machine employs needles having heels of the same length, but arranged at different distances from their hooked ends for a similar but enlarged purpose. The means here described can be used upon knitting machines having two or more actuating cams, for producing ribbed or plain fabrics.

Modern Fans and Improvements.

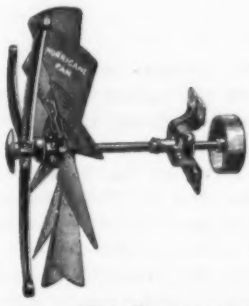
Those of our readers who may be interested in the subject of ventilation, will find it worth their while to



note the differences in the arrangement of the several fans illustrated herewith. Many manufacturers in buying a fan do not appreciate the fact that some particular type of fans might be much better adapted to their particular needs, and also be much easier to erect, than some other fan picked up at random.

A careful study of the method of locating fans, under various conditions, and also of transmitting the power to

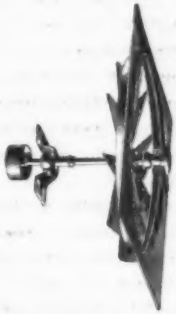
them properly, has resulted in a number of special types being manufactured by the Philadelphia Drying Ma-



chinery Co., 6721 Germantown Ave., Philadelphia, Pa.

For strength and rigidity, these fans are unsurpassed and the large

number that are in use among the many manufacturing establishments probably represent the best guarantee that the trade could ask, as to the ef-

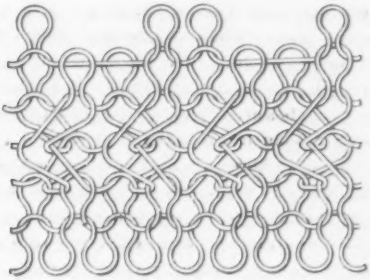


ficiency of the fans and the large amount of work done with the smallest amount of power.

A comprehensive booklet has recently been issued by this company, giving in detail the construction and the advantages of the many types of fans manufactured, and to those interested copies will be sent upon application.

Knitting Double Ribbed Fabrics.

We illustrate, herewith, a piece of knitted fabric, made after an improved method of changing in the knitting of double-ribbed fabric from comparatively closely knitted work to more open knitted work by dropping out or discontinuing of some of the wales, the object of the invention being to provide means for temporarily holding the stitches of the discontinued wales, so that they will not



ravel or run out during the knitting operation; and it consists in so forming the stitches immediately preceding the discontinuing of the wales to be dropped that the tension upon the material causes a binding of the yarn, which prevents the unsecured loops from readily pulling out of the loops into which they were formed.

—The mercerizing process is seldom used except for obtaining lustre and brilliance, or for producing some crepe effect, yet it is worth remembering that for the dyeing process it enables a saving in dye to be effected.

—The handkerchief is another textile article widely used in Paraguay, being frequently adapted to the purposes of a shirt and collar.

SILK DEPARTMENT.

Should Whole Silk Be Finished?

LUDWIG BRAUN.

Before answering this question, it is advisable in the first place to know which kind of whole silks we have to finish, and for what purposes these silks are to be used.

Under no circumstances should whole silks be finished; they should be left in the condition in which they leave the loom.

During my 20 years' experience as superintendent of a large silk factory, I have had the greatest facilities to study the different fabrics, both in the finished and unfinished state; and I have come to the conclusion that all finishing stuffs not only stiffen the fabric and spoil the gloss, but also take away the beautiful soft feeling that ought to belong to every silk.

In spite of this, there are a number of cases in which it is impossible to dispense with the finishing process. Such is above all the case with whole silks for ties. These fabrics, after being woven, have to be cut into very small pieces, and, therefore, the silk has to be of great consistency to enable the ties to be well made up. Most manufacturers hold that it is necessary to finish all silks for ties; but such is not always the case.

For thin silks, it is certainly necessary to give them a slight finishing, because in themselves they are too flimsy, and the needful consistency can only be given by artificial means. But not rarely the manufacturer overshoots the mark, and delivers a fabric that is more like glazed paper than silk.

In consequence of this over-finishing, the fabric has completely lost the true feeling of silk, while it still retains a certain brilliancy; the brilliancy is more that of a piece-dyed stuff than of pure silk. Thicker silks should in no case be finished; above all, when they consist of "Armure," or fancy ground. Should they not lay flat when they leave the looms, they should be wound tightly on the beam. Between every layer of silk should lay a layer of rough paper. In this position it should be left three or four days and then folded. On account of the pressure exercised by the beam, the silk is now in good condition. Care must be taken that the paper should be placed edge to edge so as to leave no space between.

Tie stuffs with satin or twill ground, must have a slight finishing, without which these wares have not sufficient smoothness. There lies a great difference, however, between tie stuffs and whole silk satins for dresses. These fabrics, which are in themselves of heavier material, can, by proper handling on the loom, be delivered without being finished. To obtain this result the warp must be tightly stretched, although it is generally the rule to use a loose warp for satins.

For all-silk satins for dress material, in order to obtain the necessary stiffness, a greater number of picks must be used than for half-silk satins. For black stuffs there ought to be 100 to 105 picks per inch, and for colored silks 125 to 130 per inch. This high number of picks puts, as a result, the silk in very good condition. For example, we can take the celebrated Como fabrics. These have a very large number of picks, but are entirely without finish.

All heavy qualities in faille, grains and reps should be woven on Lyons looms, because these looms have the heaviest lathe obtainable. In all taffeta fabrics the tension of the warp must be very tight. The tension of the spool must also be great. This latter important point often escapes the attention of the manufacturer, especially

in fabrics in which one starts in two, three or four-ply, the spooling requires rigorous supervision on the part of the overseer of foreman. The ends of the filling must be shot in smooth, and not previously twisted. For this purpose there are shuttles with two or three little spools, which are very recommendable.

Fabrics which get easily curled are best manufactured as follows:—

While the weaving is going on, between every layer of silk should be wound a layer of rough paper. By this process the single layers of silk are prevented from pressing one against the other, and also from watering. This is also a good control of the kind of dye used in black silks, should the dye not be pure, but mixed with oil or fat. This oil or fat immediately impresses itself on the paper.

The manufacturer should take great care never to use a filling dyed with the use of oil or fat. Should he do so, he would expose himself later on to large claims for damaged goods.

The most important point now, for the finishing of whole silk fabrics, is the dyeing and the charging of the warp and weft silk. At the present time all materials for the whole silk fabrics are more or less charged, with the exception of a few kinds of stuffs for umbrella silks. It must be remembered that a great deal of money is uselessly paid for high charging. The thread is thereby certainly much thickened, but not in proportion to the degree of charging. The volume of the thread increases only to a certain extent. The point where the silk ceases to increase to any considerable extent is perhaps reached at 20-30 per cent. over par. Even up to this point the silk does not increase in direct proportion to the charge. A thread charged 60 per cent. over par is not double the volume of a thread charged 30 per cent. Consequently such high charging is of no practical value in the case of colored silk. As the average cost of a 10 per cent. charge is 60 cents; of a 20-30 per cent., $1.90, and of a 50-60 per cent., $2.50, the weaver can reckon for himself what he can save by not too highly charging.

As regards these charged silk stuffs it is proved by experience that every finishing material exhausts more or less the charge. There is no doubt, however, that the finishing destroys the effects of the charge; that is to say, the beautiful feeling and thickness of the fabric is lessened to a certain extent by this treatment.

For these reasons it is not customary to charge the warp for ½-silk colored satins because these fabrics must be highly finished. It is also to be remarked that fabrics shot in with cuit do not take the finish so well as those which are shot in with souple. Faced damasks shot in with cuit are never finished; on the other hand, the heavy all-silk qualities in satin, which are souple shot, can support finishing much better. This mode of proceeding has this advantage over other proceedings hitherto used in that it is not visible and damages only slightly the smooth and silky touch of the fabric. This "nature-finish" is employed with profit especially in light all-silk goods. For example, serges and low qualities of tie silks. For the same purpose there is another sort of proceeding, named sprinkled finishing. In this manner the fabric is not finished over the whole surface, but it passes through an apparatus which slightly sprinkles the surface of the cloth. All these means have, in the first place, the purpose to give a stretched condition to the fabric. In regard to plain cloths it has already been mentioned that the same purpose can be obtained if the crumpled pieces are rolled again on the beam and tightly stretched.

—It frequently happens that the test for fastness under milling is performed by plaiting together several strands of the dyed yarn with undyed threads, the whole being then felted by hand or by some small appliance.

Silk Laces, Etc., in England.

Nottingham is the greatest centre in Great Britain for the manufacture of both machine-made lace and hosiery, while the product of the lace machines of the west of England, Scotland and Derbyshire, for the most part, goes to Nottingham for sale. Hosiery goods are manufactured principally in and around Nottingham and Leicester. According to a recent consular report to the State Department, Washington, the exports of silk lace for 1899 to the United States amounted to $270,261.07. This is about ten per cent. of the annual importations into the United States of laces and embroideries of silk. These English exports to the United States exceed any that are made to other countries.

The year 1899 was one of slow but decided improvement in some branches of the lace trade. For a series of years, foreign competition and adverse fashions have had a detrimental effect on the fancy silk and cotton millinery-lace departments of the trade. The depression still continues in the silk branches, but there has been a decided change for the better in the cotton millinery-lace branches; prospects are brighter at present than at the close of any recent year, and the whole trade is in a more healthy condition. There have been few departures in the current styles of lace during the year, but decided general progress has been made, though business has not yet regained the buoyancy of sixteen years ago.

The demand for Chantilly and other silk laces has not been satisfactory. The production is now in comparatively few hands, and there was not much encouragement for the production of novelties during the past year. The plain and fancy veiling branches, however, have been extensively developed. Chenille spots on black and white colored nets, as magpie, jackdaw, and fancy combinations, have been much in favor. The large demand, however, produced a superabundant supply, and competition became unhealthy, so that prices were often reduced to an unremunerative level. The trade, however, is certain to continue, though there is a severe continental competition.

Weighting Silk.

A German patent covers the use for this purpose of glue, albumen, or caseine mixed with metallic compounds of formaldehyde to make the organic matter insoluble. It is asserted that the silk receives a very high lustre, a crackling handle, and great durability, while at the same time it becomes more easy to wind. Very good results can be got without the use of metallic salts, but their use is recommended in all cases, as they make the effect still very much better.

—The report of the British Silk Association for the year 1899 has just been published. It contains much interesting information, and it is evident that the association is active in aiding the British silk trade in all its branches. For instance, the council has been in communication with the authorities at the admiralty and war office, requesting that they should make some stipulation in regard to the placing of contracts for ribbons, as the admiralty did in the case of black silk handkerchiefs, viz.:—That all ribbons should be dyed as well as manufactured in the United Kingdom. The admiralty acceded to the request, and in their specifications for the supply of black silk ribbon placed as one of the conditions "all the goods must be of British manufacture, i. e., dyeing and weaving." The war office stated that it was not proposed to lay down any condition in the contracts for these supplies beyond those already existing. The association is not repelled, however, by this customary attitude of the war office, and will renew the attack.

—For dyeing a blue woad was exclusively employed in Europe up to the sixteenth century.

Figured Silk.

Groundwork weaves of the fancy variety usually partake of the characteristics of the plainer weaves—namely, satins, reps, or hopsacks,—and although some of the so-called pinhead effects are apparently exceptions to this rule, they can generally be woven under similar conditions to one of them.

The five designs in Fig. 1 are a few examples of ground weaves which partake of the satin character in requiring a finely set warp and having that warp forming the entire visible face of the cloth where the groundwork appears. In most silks this is specially desirable, as it throws up the figure formed by the weft in bold contrast, in addition to showing a neat ground.

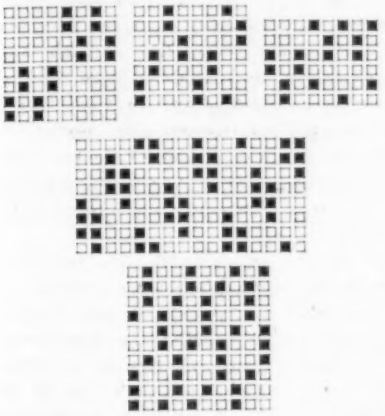


FIG. 1.

Such weaves should have the warp beam very well weighted; and if there is a large proportion of groundwork and a small figure, the going-part should strike the cloth slightly in an upward direction, if the goods are woven wrong side up, as is usually the case. If, however, the figure is large and prominence is distinctly desired, and the groundwork only patchy, or in case the wefting of the goods is weak or proportionately thin, the beat should be flat or in a slightly downward direction in a degree according to the results required.

Ground effects which partake of a rep character, like the three examples in Fig. 2, require a very similar treatment to the above, with the exception of the weighting of the warp beam, which should be much lighter. Trouble is often experienced in weaves partaking of this kind of groundwork, especially where fine raw degummed

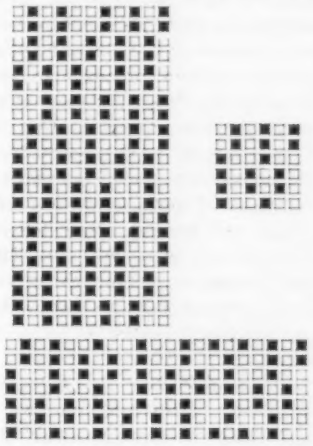


FIG. 2.

silks or fine Botany worsted wefts are used, and where the finer sets are employed, by the weft forming small loops on both sides of the fabric, chiefly on the face, and more abundantly near the selvages. These not only make additional labor in picking off, but slightly disfigure and greatly weaken the cloth. The weave disposes the cloth to this kind of thing, but with ordinary care it may be obviated. Its chief cause is by having too hard a pick, causing the shuttle to slightly rebound at the opposite box and to let in the slack, the character of the weave preventing such slack spreading itself across the cloth and compelling it to work out as one or more small loops when the slay beats up. The warp being weighted too heavily would also tend to aggravate the evil.

The above classes, along with satin and rep groundworks generally, comprise figured cloths in which the finest sets are used, and special attention

should be given to the warp yarn, otherwise all other precautions will be useless. If raw silk is used, as is usually the case, a thoroughly well-assorted organzine should be taken, preferably of Italian silk, which has been well cleaned (mechanically). If spun silk, a well gassed, extra cleaned (also mechanically) yarn should be chosen, with twist at the rate of seventeen or eighteen turns per inch in the doubling for 60/2, which is two or three turns per inch more than is used for ordinary weaving purposes.

In Fig. 3 are given four weaves which represent part of the class which is largely used instead of hopsack or mat weaves. They have the advantage of giving the mat effect without the accompanying looseness of texture, and are not quite so rigidly plain. They certainly are in themselves loose weaves, but not so much so as a hopsack design of similar size would be.

This class of weave, and also pinhead effects (four examples of this large class of groundworks being given at Fig. 4), should be woven with the warp lightly weighted. Too much weight on the warp beam spoils the raised or lumpy effect which is aimed at, and has a tendency to make the goods look thready. The blow of the reed in beating up the weft should usually be given when the shed is closed, but in the case of flimsily built cloths, or cloths in which the groundwork comprises a loosely arranged weave—as is frequently the case in these hopsack effects, and occasionally the case in pinhead weaves when making goods for purely ornamental purposes,—it is often desirable to beat the weft in just as the next shed is rising or commencing to rise. This should not be done with well-built or firmly wefted cloths, as it has a tendency to give them a harsh handle.

Speaking of figured silks generally, as much space as is conveniently possible should be left between the back of the harness and the lease rods, and the foremost rod should be as thinly made as is consistent with the width of the warp and the strain put upon the rod. Even with this precaution there is often a tendency on the part of fine silks having a satin or similar smooth ground to develop marks

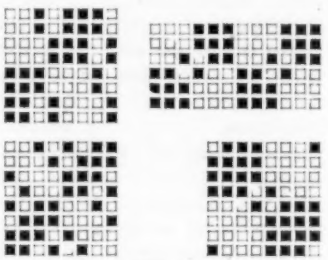


FIG. 3.

warpways, somewhat similar to reed marks, but really caused by the unequal strain on the warp of the threads which lift from the front lease rod on an open lease against those which lift on a crossed lease. This defect may be generally obviated by employing a couple of rods, one above and one below the warp, tied in front of the foremost lease rod. This arrangement is specially useful in case of combinations of healds with harness, which, by increasing the lifting area, exaggerate the inequality of tension.

On the other hand, this last-mentioned fault is sometimes utilized, as is found in the case of figured silks having plain grounds. In such goods, especially those containing an even number of threads in each dent of the slay, there is a tendency to develop reediness, which defect can generally be overcome by having a good thick lease rod in front, the unequal strain caused by which generally breaks up the reediness. Where this fails to achieve its object, the desired result may generally be obtained by changing the lease—that is, by changing the top set of warp threads on to the bottom of the lease, and allowing the lower half of the warp to be in their place.

It is needless to say that a bad selvage goes a long way towards marring the appearance of an otherwise perfect cloth. Temples are seldom

used in silk weaving, so no trouble is caused by their tearing or straining the edge of the fabric. Most groundworks should have a corded or rep selvage, the only exception of note, perhaps, being the looser class of plain grounds. The float or size of the rep should be regulated according to the quantity of weft, either as regards thickness or number of picks, and should not only make a neat looking selvage, but should be of a like tightness and elasticity as the body of the piece.

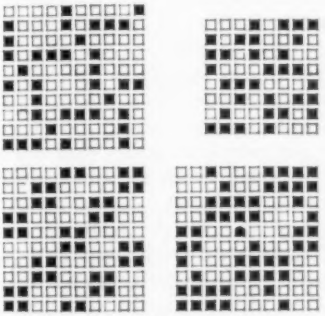


FIG. 4.

Apart from improper designing of the weave, bad selvages may be caused by undue tension of the weft on leaving the shuttle, and even with this item correctly arranged, bad picking may cause the trouble, especially a pick which, either by its lateness of picking or its weakness of force, tends to leave the shuttle struggling out of the shed as the warp threads are well advanced in their closing.

In designing figured chenes, care should be given to a proper matching of the color of the print with the color of the weft. This is frequently omitted, it being deemed sufficient to have a proper combination of color between the shade to which the warp has been dyed and the colors of the print upon it, and a large number of wasted patterns may be saved by noting that in figured chenes the jacquard figure is usually formed by the weft, which is brought prominently to the front and made an important factor in the arrangement of the coloring of the fabric as a whole. Even in figured chenes having a cotton weft and figure formed by the warp, the effect of the weft color is distinctly discernible, and should be arranged for accordingly.

Cotton used in conjunction with silk cannot usually be so completely hid or covered when woven into figured goods as in plain ones, and it is advisable in cases where the same shade in both yarns is intended to be alike, to dye the cotton well on the dark side of the silk shade. The goods have less of a cottony look, and are more serviceable in wear, as the cotton fades in color much sooner than its silk companion.—Textile Manufacturer.

—Statistics published in the "Moniteur des Soies" show the production of silk cocoons in Spain in 1899 to have amounted to 895,000 kilos. Taking the average production of raw silk from cocoons at the rate of 12 kilos. of cocoons to one of silk, the total may be taken as representing about 74,500 kilos. of silk. It is also to be noted that about 50,000 kilos. of cocoons are used for making fishing lines, an industry which is carried on solely in Murcia. During the last five years the production of silk cocoons in Spain has been as follows:—

1895....	1,200,000	kilos.	= 100,000	kilos.	raw silk.
1896....	1,225,000	"	= 102,000	"	"
1897....	1,120,000	"	= 95,000	"	"
1898....	960,000	"	= 80,000	"	"
1899....	895,000	"	= 74,500	"	"

The diminished yield in 1899 is attributed principally to disease among the silkworms, traceable to some extent to the extreme heat.

—The knowledge we possess of indigo all points back to India, the cradle of the human race, as the country in which indigo was used for dyeing before any other country known to us.

—The cultivation of woad for dyeing purposes began in Europe as early as the sixth century, and became especially extensive in Saxony and Thuringia.

Silk Industry of the United States.

One of the most interesting features of the industrial development in the United States during the last generation has been the growth of the manufacture of silk goods. Forty years ago this country imported 87 per cent. of all the silk goods used in the country. Today, with a vast addition to the demand due to growth of population and wealth, the country is importing only 15 per cent. of the silk goods it consumes and has become the greatest manufacturer of silk goods in the world. In further reference to this we would call attention to an editorial on the silk industry in our April issue. In addition, this country has wrested from Europe and Asia the supremacy which they once possessed in this industry. Within the recollection of men of only middle age, the people of the United States were almost wholly dependent upon Europe for every article of wear of which silk was the principal component part. Today this country supplies its entire market with everything in silk goods except the finest products of the hand looms of Lyons, Crufield and Zurich. The prospect is that within a few years importations from these centres will be too small to be considered from a commercial point of view except as among the curiosities of trade statistics.

The day of Europe in the American silk market is over and the only competition which it is believed Americans still have to fear is that of the Orient, where in China and Japan the open-door policy is leading to the introduction of modern machinery and methods, which, added to cheap labor, may yet make them dangerous rivals in this and other industrial fields. While the silk manufacturing industry in America has had many ups and downs, so far as its profitable condition is concerned, its growth since 1860 has been on the whole constant, representing, decade by decade, just about the natural increase in the country's consumption of such goods and keeping the importations down to figures which have varied little from constant quantities. Within the last few years the business has taken a firmer grip and now shows a strong tendency to wipe out the importation figures altogether.

The trend of progress by our silk manufacturers is shown in the following figures, which a writer in the New York Sun has employed, as part of an interesting article on the American silk industry: In 1860 we made only 13 per cent. of the silk goods consumed in the country; in 1870 we had advanced to 23 per cent.; in 1880, to 38 per cent.; in 1890, to 55 per cent. and in 1898, to 85 per cent. This year it is believed that the tables will be completely turned about and that only the 13 per cent., which we made ourselves in 1860, will be sent to us from all the rest of the world. While we have thus been superseding Europe in supplying ourselves with silks and satins, velvets and all the other luxurious and useful products of silk, our importations of the raw product of the silk worm have as steadily increased until today we are using fully one-third of the entire world's product of marketable silk. In this regard our beginnings were most modest. As lately as 1875 we imported only 1,101,681 pounds of raw silk and 5737 pounds of spun silk, worth altogether about $4,525,000, while for the year ending June 1, 1899, the imports of raw and spun silk were 6297 bales, containing more than 10,500,000 pounds and valued at $32,735,464. The growth of the importations of raw silk has been constant on the whole, although one can detect in the tables giving the yearly returns evidences of the industrial and financial troubles which the country has been through in that time. In 1877 and 1878 the importations of raw silk were something like 160,000 pounds less than in 1876. The value of the silk in 1877 was about $1,500,000 less than in 1876 or 1878. Again, in 1891 the importation fell off from 5,943,360 pounds in

1890 to 4,917,688 pounds, and in 1894 it dropped to 4,956,875, after having been up to the 7,500,000 mark for both 1892-3. In 1896 it jumped to 8,000,621 pounds, and fell again in 1897 to 6,513,612 pounds to average up. In 1898 it reached 10,315,162 pounds. Prices, too, have had considerable to do with these fluctuations, having varied from $1.87 a pound for raw Canton silk to about $6.

The raw silk comes from France, Italy, Austria, Spain, China, Japan, India and the Levant. Excluding the amount used at home in China and Japan, of which there is no record obtainable, the world's production of raw silk last year was 34,063,274 pounds, and this year it is estimated that it will reach nearly 36,000,000 pounds. Of this China produces both the largest amount of any one country and the best quality. In all the other countries the worms in the cocoons are killed by roasting before the silk is wound off, and this reduces the lustre of the filament, but in China the filament is reeled off while the worms are still alive. This practice militates, however, against the quality of the silk in another way. The reeling is done at the homes of the silk raisers and is of very uneven quality. Most of this silk has to be re-reeled before it can be marketed. China sends into the markets about 16,700,000 pounds of raw silk. Japan comes next with 7,250,000 pounds and Italy a close third with 6,250,000 pounds. France produces about 1,400,000 pounds, Austria 520,000, Spain 175,000, India 650,000 and the Levant 2,350,000 pounds.

The firm establishment of silk manufacturing dates from 1860, when French silks were admitted into the English markets free of duty. A great silk industry had grown up in England previous to that date and we drew our supplies of these goods in about equal quantities from England and France. With French goods admitted free, the English silk throwers and weavers were forced out of their own markets and many of them came to this country, bringing with them their machinery and hands. They found Paterson, N. J., the most desirable place in which to settle, and here they built up their industry. Paterson was already the home of the Pioneer Silk Company's mills, started in 1840 by John Ryle, and this was the first enterprise of the kind begun in America which was destined to live. In 1855 Hamil & Booth built a second silk mill in Paterson, and these two, with a few others, were the nucleus around which the influx of Englishmen gathered.

There had been no lack of attempts to establish the silk industry in this country in all branches, from the growing of the silk worms to the making of finished goods. These attempts had been encouraged by the Crown and State from the time of the earlier settlements and had resulted in great industrial crazes at times, but in nothing more permanent except the establishment of a number of factories where sewing silk and trimmings were made. Many of these survive and were doing business when the English weavers came over in 1860.

(To be continued.)

—The report of the Association of the Silk Industry of Zurich for the year 1898 contains the statement that the number of establishments working by hand has, since the year 1895, increased by 1,334, or 6 per cent., the total being now 23,513, while the number of workmen and employees has increased to 42,354. The figures indicating the sum total of the raw material used, etc. (silk, spun cotton, wool, etc.), are—although more than a year behind time—of particular interest—namely, 1897, 1,545,526 kilos., 1895, 1,303,100 kilos., and 1893, 1,477,589 kilos.; while the lengths of the woven goods produced were: 1897, 43,092,226 metres; 1895, 35,823,140 metres, and 1893, 33,539,204 metres, the net value being: 1897, 89,443,628 francs, and 1895, 79,758,000 francs.

POWER DEPARTMENT.

ELECTRICITY—STEAM—WATER.

Painting and Whitewashing by the Spray System.

We are sure this method of painting and whitewashing will interest textile manufacturers, and in fact all who require such work. The Triumph Machine and Mfg. Co.'s machine was first used on the World's Fair Buildings in Chicago, giving complete satisfaction. If it had not been for the facilities afforded by this machine, the vast surface of these beautiful buildings, covering hundreds of acres, could not have been whitened in time for the Exposition. Every one of the millions who saw these buildings can testify to the excellence of the work.

THE TRIUMPH PAINT SPRAYER.

The machine, of which a cut is here shown, is equipped with the new Triumph Spray, especially designed for its purpose, and is compact, durable, and thoroughly constructed. By its use large areas can be rapidly and thoroughly covered, requiring no scaffolding. No special knowledge is required in its operation, and it is claimed that one machine will do the work of a dozen men.

Textile manufacturers are especially interested in white walls and ceilings, as they add so much to the light in the workrooms, and have such a beneficial effect on the work and the health of the employees. The expense of labor in painting the walls by hand is considerable, and often causes this work to be postponed, to the detriment of the mill.

This machine applies both oil and water paints, kalsomine and wh. e

wash, and can be used in spraying trees and vegetation subject to damage by insects. It is claimed that the work is as well done for factory purposes as by hand and is economical with the plant. Two sizes are made: No. 1, which costs $40.00, and No. 2, $50.00. The Triumph Machine and Mfg. Co., 209 Hester St., can give any further information desired.

Ventilation Without Drafts.

Paper read by Arthur Rigg before the Society of Arts, England.

There is nothing people take so little care of as their own lives; and those who would never offend against the laws of their country, which are of human origin, constantly outrage the laws of health, which are Divine. The sentence on one may be a temporary discomfort; but the sentence on the other is disease and death. Already science has done much towards removing evils and prolonging life, for example, in modern systems of sewage disposal, and the supply of pure water; but no corresponding progress can be claimed in such sister branches as the removal of carbonic acid, etc., from air that has been breathed, and the supply of pure air to replace it, both of which operations are included in the term "Ventilation."

As usually practised, ventilation bears a far closer relationship to art than it does to science; and although many exhausters serve as very ornamental finials to a roof, yet they produce drafts, and other evils, worse than those they are intended to cure. Ventilation, contemplated as a science, will include warming or cooling an ample supply of air, and the washing, diluting, or removal of deleterious ingredients contained in air which has been breathed. Although many positive statements have been made on the subject, without much foundation in fact, and many "patent" ventilators exist, yet very little of a scientific character is obtainable; perfection seems a long way off, and a proper reliable system can hardly be said to exist. But with the purely medical side of the question it is different. The modern science of bacteriology explains much that was once mysterious, and it shows conclusively that, for the maintenance of health, a supply of fresh air to breathe is equally important, if not more important, than a supply of pure water to drink; and, fortunately, no possible conflict of opinion can occur as to the source from which such a supply of fresh air can be obtained.

A factory inspector in England is the authority for the report that the English workpeople are breathing over and over again the same air, vitiated with gases more or less impregnated with dust, and other impurities, and every hour appreciably deprived of blood-purifying and life-sustaining properties. The natural consequence is the development of anæmia, dyspeptic, and phthisical tendencies, and low states of vitality, predisposing to epidemics of zymotic disease.

Although improved sanitary arrangements have raised the average duration of human life beyond what it used to be half a century ago, and done this by cultivating a better knowledge of the laws concerning health, it is perfectly certain that there is no such thing as finality, and all our applications of science are susceptible of improvement. Ventilation, considered as a science, under the usual existing conditions is entirely in its infancy, and a little research into what has been done and written in regard to this subject, cannot fail to be interesting and instructive. What has been written does not go very far beyond the advocacy of certain exhaust ventilators, of more or less artistic design, intended to be fixed on the roof.

The following conclusions were arrived at by a committee to consider a suitable system of ventilation for a university building:

1. Foul air to be removed from below.

2. Inlets for fresh air should be high up, and distributed around the circumference of the room.

3. The total supply should be 6 cubic foot per sitting per second (an amount which was found to be far too much).

The supply of fresh air from above and the withdrawal of foul air from below, although contrary to received popular opinion, was not new, as it was advocated by the celebrated General Morin, and was carried out at the Conservatoire des Arts et Metiers, Paris, not, however, by General Morin himself, but by architects and builders, who perhaps not understanding the innovation, neglected the precise instructions given, so that considerable drafts were found at the lower exits, probably from cold air entering where vitiated air was intended to depart.

Where, however, the ventilation, as at the Trocadero Palace, in Paris, was controlled by a fan (11 ft. 6 in. diameter, with eight blades, making ten revolutions per minute), the downward system of ventilation used in summer was found to be very satisfactory in its action.

When the Glasgow University buildings were completed, it was found that warm air, entering at about the middle height of the rooms, flowed away through the upper outlets, so it became necessary to open the windows in winter to provide air for crowded classes.

In 1864, the Rev. Arthur Rigg, wrote a report upon ventilating the infirmary at Chester. Little can now be added to the descriptions of ventilating systems taken from five paragraphs in this report, which read as follows:—

"Means for Controlling Ventilation.—One of two means is usually resorted to for controlling the ventilation of rooms in which persons are continually resident. The most common is the extraction of air by some of the many schemes for exhausting or drawing air out. The other is, forcing air into the room. Although in each case fresh air is introduced, and that which has been vitiated removed, yet the effects are so different that circumstances must determine which plan is most likely to meet particular requirements.

"In the process by exhaustion, every crevice becomes an inlet for air, and there is thus at each chink or crannie, a draft, hence the drafts in ordinary dwelling-rooms, with fires which depend for the combustion of fuel upon the air of the room. Further, the intensity and character of the burning are continually changing the amount of air influenced by these causes.

"In the process by condensation, these crevices become outlets, and consequently there are no drafts for them."

The former is called the "vacuum," and the latter the "plenum" system.

In discussing the many failures to ventilate large buildings, a well known authority concludes with the proposition that no large building can be successfully ventilated without the use of fans or other mechanical force, and he recommends the extraction of "foul" air from the top of the room or building, and the admission of fresh air through a Tobin tube or other similar arrangement having its discharge some 5 feet above the floor.

It will be clear that from considerations of health and comfort, as well as from affecting the duration of life, the subject of ventilation ought to be of paramount importance; and judging from the opinion now discussed, and many more which might be quoted, the whole business is completely at sea, and the aspect of this important subject is that of a desperate evil as things are, and no sort of scientific remedy apparent to guide designers how they ought to go.

Every advocate of a ventilating system has his own special remedy for overcoming its acknowledged difficulty; nevertheless, however well these systems sound in theory, they generally fail, or may be only partly successful in practice; so the only hope remaining is to go to Nature and

study her laws, so as thereby to gain a clearer knowledge how to accomplish that which natural laws succeed in doing when not interfered with by the blundering works of man.

The movements of large volumes of air for purposes of summer or winter ventilation may be carried out generally in three different ways, already noted:—

1. By vacuum (drawing air out of a room).

2. By plenum (forcing air into a room).

3. By a combined plenum and vacuum system.

Furthermore, admission of fresh air may take place—

(a). At the floor of a room.

(b). At, or near the top of a room.

(c). At intermediate levels.

Where special exits for foul air are provided, these may be situated at the top of a room for ascending currents, or at the floor of a room for the descending current system of ventilation.

The three systems of working with the six variations in admission or extraction of air give possibilities of great variety in the arrangements, which is very fortunate, as no hard or fast line can be maintained, for every position requires its own special consideration; and once the correct general principles are firmly rooted in people's minds, their application to suit every variety of condition is comparatively a simple matter.

The vacuum system is the commonest system of ventilation, when applied to large halls, requires a powerful suction ventilator, generally fixed in the top of a room; and usually no provision whatever is made for an adequate supply of fresh air, consequently cold air is sucked underneath doors, flooding the floor with a layer of low temperature; also through cracks and crannies, causing high velocity drafts, which travel great distances, and produce any amount of discomfort and injury to health.

In ordinary dwelling-rooms the fire acts like the ventilator in drawing air out of dwelling rooms. As a rule, the first draft of importance is that under the doorway, while leaky windows contribute their quota, and an altogether surprising amount of air is drawn through the solid walls. In an ordinary living-room, with a fireplace, an almost ideally perfect system of ventilation can be carried out by admitting fresh air in divided streams into the upper parts of such rooms, where it may mix with the warmer strata it finds there, and gradually descend and pass away eventually up the chimney.

Innumerable buildings and large assembly-rooms are ventilated on the pure vacuum system, and there is not a town of any moderate size which cannot furnish examples of this most barbarous arrangement.

By the plenum system, pure and simple, fresh air is forced into the room at any convenient locality, so no stagnant places need occur; and "foul" air finds its way out by open doors, windows, or leakages; in fact, through the very openings whereon advocates of the vacuum system rely for providing their supply of fresh air. The plenum system is independent of winds and weather; and indeed each system is essentially the opposite of the other.

By the combined operation of plenum and vacuum, considerable volumes of fresh air can be forced into a room, and a corresponding quantity can be extracted by a ventilator, situated generally on the roof.

But by whatever method a supply of fresh air enters a room, there are two grand divisions in which its disposal can be arranged—

1. As a general upward flow, from floor to ceilling, or roof, and out at the top.

2. As a general downward flow, from ceiling to floor, or roof to floor, and out at the floor.

There is nothing people cultivate more assiduously than the want of common sense, and the existing in-

complete theories in regard to ventilation are generally due to confusion of ideas.

While it is quite true that hot air ascends, because bulk for bulk it is lighter than cold air, it is also true that carbonic acid gas, discharged from the lungs, is half as heavy again as air of corresponding temperature; and the feeble force whereby air may be caused to ascend cannot prevail for long against the heavier carbonic acid gas which falls to the ground while cooling, and obviously ought to be extracted there to rest near the earth, and feed the grasses of the field.

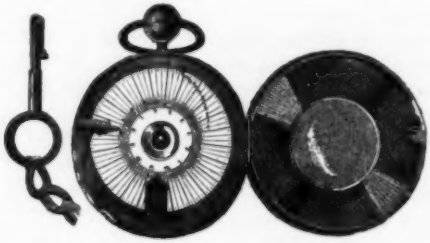
In regard to the ventilation of buildings it is too often assumed that there is no happy medium between that of breathing air utterly foul and a system so profoundly scientific that by no chance shall any part of the air that has been once breathed enter the lungs.

The common-sense system mixes fresh air with that which has been breathed, or may be breathed again, and it does this without drafts or appreciable inconvenience, while the over-scientific system sends large volumes of cold or heated de-vitalized air into the room, and expects the forceful, irregular currents to travel in all sorts of ingenious ways that no independent currents would ever be likely to follow under any natural impulse.

—It was only natural that such a valuable coloring matter as indigo soon commanded the attention of travelers to India.

Improved Watchman's Time Detector.

The accompanying cut shows the latest improved watchman's time detector, sold by Nanz & Co., 127 Duane Street, New York. It is well adapted for textile mills, where it is necessary for a man to visit frequently a number of widely separated rooms during the night. In many mills it will be found necessary to travel one or two miles to go over the watchman's route once. When we consider that he is expected to make a round every hour, it is evident that some device must be employed by which the mill owner will know whether these many miles have been traveled or not. In the Nanz & Co. system, a dial is placed inside the clock, and keys are fastened



in different parts of the buildings, which the watchman should visit; each key makes an independent mark on the dial, which shows the exact time at which the visit was made. The dial in this way becomes an accurate record of the presence of the watchman at the stations during the night.

A new dial, on which the date is written, is placed on the clock each day, and the old ones are filed away for reference by insurance inspectors, or any one interested.

—The plants used for making indigo do not thrive in Europe; there are, however, quite a number of other plants which contain indigo, but in much smaller quantity than in those growing in tropical climates.

—Spinning in China is not unlike our own primitive methods.

DYEING DEPARTMENT

Dye Recipes for May.

The following recipes appear in the Dyers' Supplement, which is issued each month by the TEXTILE WORLD. The Supplement contains the colored samples, dyed according to recipes given. The selection of samples is carefully made, and it is the aim to show shades which are of especial interest to the dyer, and which the requirements of the market demand. The Dyers' Supplement is a 16 page pamphlet, in convenient form for preservation. Subscription price for the TEXTILE WORLD with the Dyers' Supplement is $4.

Recipe No. 65.

Orange on Cotton Yarn.

Klondike Orange No. 163 on 100 pounds cotton yarn.

Prepare the dye bath with

25 lbs. Common Salt.

3 lbs. Klondike Orange No. 163.

(Schoellkopf, Hartford & Hanna Co., 100 William St., New York.)

Enter yarn at 180° F., and bring to a boil while working, and dye at this temperature for one hour.

Klondike Orange No. 163 has a high coloring and penetrating power.

Recipe No. 66.

Tan on Cotton Hosiery.

Tan H on 100 pounds cotton hosiery.

Prepare dye bath with

25 lbs. Common Salt.

2 lbs. Tan H.

(New York & Boston Dyewood Co., 55 Beekman St., New York.)

Enter material at 150° F., bring slowly to a boil and dye at this temperature for one hour.

Tan H is recommended for the production of tans on cotton hosiery. (See recipe 64, April issue, for a shade of tan from Tan R.)

Recipe No. 67.

Dark Green on Worsted Yarn.

New Azo Acid Green B on 100 pounds of worsted yarn.

Prepare the dye bath with

5 lbs. Acetic Acid.

10 lbs. Glauber Salt.

5 lbs. New Azo Acid Green B.

(C. Bischoff & Co., 87-89 Park Place, New York.)

Enter yarn at 170° F., bring to a boil, and dye to exhaust the bath if possible—not less than one hour.

New Azo Acid Green B is fast to all of the agencies to which dyed material is subjected; and is an exceptionally desirable color. (See recipe 54, April issue.)

Recipe No. 68.

Reddish Violet on Worsted Yarn.

Phenylene Violet R on 100 pounds worsted yarn.

Prepare the dye bath with

2 lbs. Sulphuric Acid. (Added gradually.)

or

4 lbs. Acetic Acid. (Added gradually.)

4 lbs. Phenylene Violet R.

(Sykes & Street, 85 Water St., New York.)

Enter the yarn at 180° F., bring to a boil and dye at this temperature for one hour or until the bath is exhausted.

Phenylene Violet R produces shades very fast to acids, alkalies, fulling and light on wool; and is quite as fast on silk as ordinary acid colors. It possesses a remarkable fastness to light. (See recipe 62, in April issue, for a shade of violet with two per cent. of this dye.)

Recipe No. 69.

Blue on Cotton Yarn.

Benzo Copper Blue B on 100 pounds of cotton yarn.

Prepare dye bath with

4 lbs. Benzo Copper Blue B.

(Farbenfabriken of Elberfeld Co., 40 Stone St., New York.)

20 lbs. Glauber Salt.

1 lb. Soda.

Enter material at 180° F., bring to a boil and dye at this temperature for one hour.

The fastness to light and washing may be considerably increased by

after-treating for ½ hour at 140° F. with

2 lbs. Copper Sulphate,

or

1¼ lbs. Potassium Bichromate.
1¼ lbs. Copper Sulphate.
½ lb. Acetic Acid.

Benzo Copper Blue B produces a blue with a fine indigo tone, which, when after-treated, is remarkable for its fastness.

Recipe No. 70.

Pink on Cotton Yarn.

Direct Pink No. 249 on 100 pounds of cotton yarn.

Prepare the dye bath with
20 lbs. Common Salt.
¼ lb. Direct Pink No. 249.
(Schoellkopf, Hartford & Hanna Co., 100 William St., New York.)

Enter yarn at 180° F., bring to a boil while working, and dye at this temperature for one hour.

Direct Pink No. 249 may also be used on cotton and wool mixed goods, 3 per cent. giving a beautiful rich red.

Recipe No. 71.

Dark Buff on Cotton Yarn.

Direct Dark Buff on 100 pounds of cotton yarn.

Prepare the dye bath with
20 lbs. Common Salt.
1 lb. Direct Dark Buff.
(O. S. Janney & Co., 8-10 Letitia St., Philadelphia, Pa.)

Enter yarn at 180° F., and while turning raise to the boil for one hour, then wash and dry.

Direct dark buff gives a good and full shade of buff or tan and as the bath is not exhausted is practical to be used in a standing kettle. If used in sufficient quantity, say three or four pounds to the hundred, this dyestuff will produce browns which are fairly fast to light and washing. (See recipes in previous supplements for shades of colors from other direct dyes.)

Recipe No. 72.

Blue on Cotton Yarn.

Diazine Blue 2 B on 100 pounds of cotton yarn.

Prepare bath with
20 lbs. Common Salt.
3 lbs. Diazine Blue 2 B.
(The Stone & Ware Co., 157 Maiden Lane, New York.)

Enter yarn at a temperature of about 180°-190° F., raise to the boil, and dye at this temperature for at least one hour.

By allowing the yarn to remain in the bath for a few minutes after the heat is removed from the kettle, the bath may be exhausted a little better. The bath should be kept as concentrated as possible, and if used for a second dyeing the amount of dyestuff used may be reduced considerably.

Diazine Blue 2 B appears to penetrate the fibre exceptionally well, and goes on evenly.

Recipe No. 73.

Light Tan on Cotton Hosiery.

Diphenyl Catechin B on 100 pounds cotton hosiery.

Prepare dye bath with
25 lbs. Common Salt.
½ lb. Diphenyl Catechin B.
(John J. Keller & Co., 104-106 Murray St., New York.)

Enter at 180° F., bring slowly to a boil, and dye at this temperature for one hour.

Diphenyl Catechin B is valuable in the production of tans. (See recipe 61 in the April issue, for a shade of tan from one per cent. of this dye.)

Recipe No. 74.

Black on Worsted Yarn.

Manhattan Black B on 100 pounds of worsted yarn.

Prepare the dye bath with
3 lbs. Oxalic Acid.
15-16 lbs. Manhattan Black B.
(Anchor Color Manufacturing Co., 462-466 Cherry St., New York City.)

After the dyestuff is thoroughly dissolved, enter the yarn cold, bring to a boil, and dye at this temperature for one and one-half hours.

Manhattan Black B gives a jet black, and is very fast and cheap.

If a black is desired on mixed goods

it can be obtained by treating the cotton with sumac and iron.

Recipe No. 75.

Tan on Cotton Yarn.

Columbia Tan C M E on 100 pounds cotton yarn.

Prepare dye bath with

3 lbs. Columbia Tan C M E.
(Berlin Aniline Works, 72 Front St., New York.)

20 lbs. Common Salt.

Enter material at 180° F., bring to a boil, and dye at this temperature for one hour.

Tan C M E is very desirable for use on cotton hosiery and webbing.

Recipe No. 76.

Indigo Blue on Cotton.

Diazo Indigo Blue M on 100 pounds of cotton yarn.

Prepare dye bath with

5 lbs. Diazo Indigo Blue M.
(Farbenfabriken of Elberfeld Co., 40 Stone St., New York.)

1 lb. Soda.

15 lbs. Glauber's Salt.

Enter at 180°, bring to boil and dye at this temperature for one hour.

Rinse in a cold bath, acidulated with a very little hydrochloric acid, then work for 15 minutes in the cold diazotizing bath made up with

3 lbs. Nitrite of Soda (previously dissolved).

8 lbs. Muriatic Acid.

Rinse and develop in a cold bath made up with

2 lbs. Developer A.

Wash well and finish in the usual way.

Diazo Indigo Blue M produces a shade very similar to indigo, and is extremely fast.

Recipe No. 77.

Red on Cotton Yarn.

Tetrazo Red 5 R on 100 lbs. of cotton yarn.

Prepare the dye bath with

3 lbs. Tetrazo Red 5 R.
(New York & Boston Dyewood Co., 55 Beekman St., New York.)

25 lbs. Common Salt.

Enter the yarn at 180° F., bring to a boil, and dye at this temperature for one hour.

Tetrazo Red 5 R is especially fast to acids and particularly desirable where a color for webbing and to stand perspiration is required.

Recipe No. 78.

Green on Worsted Yarn.

Compound shade. Brilliant Milling Green B; Milling Yellow O—on 100 pounds carpet yarn.

Prepare the dye bath with

10 lbs. Glauber's Salt.

3 lbs. Acetic Acid.

2 lbs. Brilliant Milling Green B.

2 lbs. Milling Yellow O.
(Wm. J. Matheson & Co., Ltd., 182 Front St., New York.)

The goods are entered at 140° F., brought to a boil within 20 minutes, and after boiling one-half hour, the bath is exhausted by adding

5% Bisulphate Soda

and boiling one-half hour longer.

The shade thus produced has remarkable brilliancy, and is fast to milling. (See recipe No. 37 in March issue for a green from Brilliant Milling Green B, used alone.)

Recipe No. 79.

Black on Cotton Yarn.

Anthracene Black F on 100 lbs. of cotton yarn.

Prepare dye bath with

30 lbs. Common Salt.

15 lbs. Soda Ash.

15 lbs. Anthracene Black F.
(C. Bischoff & Co., 87-89 Park Place, New York.)

Enter at 180° F., bring to a boil and dye at this temperature for one hour, then wash with cold water and finish.

The shade thus obtained is a very dark brown and stands washing better than most dyes of this class, also light and acids.

It may be made absolutely fast to

after-treating for ½ hour at 140° F. with

2 lbs. Copper Sulphate,

or

1¼ lbs. Potassium Bichromate.
1¼ lbs. Copper Sulphate.
½ lb. Acetic Acid.

Benzo Copper Blue B produces a blue with a fine indigo tone, which, when after-treated, is remarkable for its fastness.

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Direct Pink No. 249 on 100 pounds of cotton yarn.

Prepare the dye bath with

20 lbs. Common Salt.
¼ lb. Direct Pink No. 249.

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Enter yarn at 180° F., bring to a boil while working, and dye at this temperature for one hour.

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Direct dark buff gives a good and full shade of buff or tan and as the bath is not exhausted is practical to be used in a standing kettle. If used in sufficient quantity, say three or four pounds to the hundred, this dyestuff will produce browns which are fairly fast to light and washing. (See recipes in previous supplements for shades of colors from other direct dyes.)

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Diazine Blue 2 B appears to penetrate the fibre exceptionally well, and goes on evenly.

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Diphenyl Catechin B on 100 pounds cotton hosiery.

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½ lb. Diphenyl Catechin B.

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8 lbs. Muriatic Acid.

Rinse and develop in a cold bath made up with

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Wash well and finish in the usual way.

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Enter at 180° F., bring to a boil and dye at this temperature for one hour, then wash with cold water and finish.

The shade thus obtained is a very dark brown and stands washing better than most dyes of this class, also light and acids.

It may be made absolutely fast to

fulling by an after-treatment for one-half hour in a cold bath containing blue stone, one-third of the amount of Anthracene Black F taken. If the same amount of bichromate of potash or soda is added, and a small amount of acetic acid, the shade will be thrown somewhat to the reddish side.

Recipe No. 80.

Orange on Cotton Yarn.

Direct Orange on 100 pounds cotton yarn.

Prepare the dye bath with

1 lb. Direct Orange.

(O. S. Janney & Co., 8-10 Letitia St., Philadelphia, Pa.)

20 lbs. Common Salt.

Enter yarn at 180° F., and while turning raise to a boil and dye at this temperature for one hour. Wash and dry.

Direct Orange dyes a full shade of orange at one pound to the hundred, dyeing evenly, and possessing a fair degree of fastness against light and washing. This orange serves well as a self color, or in combination for the production of browns and tans.

Note on the Substantive Sulphur Colors.

Paper read by C. Fercoq, before the Foremen Dyers' Guild, Bradford, England.

In 1873 Messrs. Croissant & Bretonniere found that by treating organic compounds of widely diverse origin with alkaline sulphides or polysulphides, coloring matters were obtained of various shades which possessed the remarkable property of dyeing unmordanted cotton.

All these coloring matters met with an extensive application in consequence of their valuable tinctorial properties, and were manufactured from the beginning by the St. Denis Dyestuff & Chemical Co., under the name of Cachou de Laval.

From a chemical point of view Croissant and Bretonniere's reaction has since then been the subject of a large number of researches. It has been applied to many organic substances, including aromatic compounds of known constitution, with remarkable success, and the importance of the dyestuffs belonging to this category has thus been enormously increased.

It is now known that a large number of dyestuffs, such as the Thiocatechins, Vidal Black, Immedial Black, St. Denis Black, etc., are closely associated with this initial discovery.

It was very difficult from a chemical standpoint, taking into account the very complex nature of the raw materials treated with alkaline sulphides or polysulphides, to draw any conclusion as to the nature of the reaction which might explain it and permit of systematic improvements. In spite of these difficulties, the St. Denis Co. had reason to conclude that of all the vast array of aromatic substances, those substituted in the para position either by two amido (NH_2) groups or by one OH group and one NH_2 group are particularly suited for the preparation, by the action of alkaline sulphides or polysulphides, of substantive coloring matters, as M. Vidal had already discovered in the case of hydroquinon, an aromatic substance having two OH groups substituted in para position.

Seeing the impossibility of technically utilizing this latter discovery on account of the prohibitive price of hydroquinon, these researches were continued, and in 1893 the St. Denis Co. and M. Vidal patented a practical process which was subsequently carried out on a large scale for the preparation of new coloring matters, consisting in treating, either with sulphur alone or with sulphur and alkaline sulphides, para-amido phenol, paraphenylene diamine, the amido naphthols, the diamido naphthalenes, the indamines, etc., or of compounds capable of yielding these substances. These coloring matters, which are produced by the same reaction as Cachou de Laval, differ essentially from the latter by the shade they yield, dyeing un-

mordanted cotton in various shades of black, which possess, like Cachou, great fastness to light, acids, and alkalies. These properties impart to them great technical value, and the success which they met with brought forth a large number of researches.

Two directions were open to those who aimed at improving the new discovery for their own advantage: the preparation and use of well-defined raw materials which had not been utilized up to the time, or a modification of the process employed.

The number of patents in which new raw materials are used is considerable; it was tried, for instance, to substitute for para amido phenol or para phenylene diamine various sulphonated amido hydroxyl or diamido compounds, such as the sulphonated amido phenols or amido naphthols, but these experiments do not seem to have met with much success. Other investigators substituted for the indamines, the use of which was claimed by the St. Denis Co., the indophenols, a class of bodies closely related to the indamines; others again used the diphenylamines containing at least two substituted groups which are nothing else than the reduction products of these same indamines and indopnenols. The use of these diphenylamines can scarcely be regarded as an invention, for if it be borne in mind that sulphide of soda is an energetic reducing agent, it is clear that the employment of diamido diphenylamine, for example, comes back to the employment of indamine, since this latter is transformed by reduction into diamido diphenylamine. Nevertheless a large number of diphenylamines, having at least two substituted groups in the para position, and containing besides sulpho, nitro, carboxyl groups, etc., have been prepared and utilized for the manufacture of black dyestuffs, but they cannot be considered to present any advantage as far as the quality of the coloring matters formed is concerned.

It should moreover be noted that the choice of these raw materials has in certain cases led to discoveries of great practical interest. Thus, for instance, the St. Denis Co. found that the use of amido hydroxyl or diamido compounds substituted in the para position usually gives rise to coloring matters which dye cotton directly, but in shades varying from yellow to brown. From this observation, which further enlarged the range of substantive sulphur colors by the addition of new shades, there resulted the discovery of the products manufactured by the St. Denis Co., under the name of Thiocatechines.

The second direction according to which investigators could hope to obtain substantive sulphur colors not covered by the patents was the discovery of a new process in which the raw materials, already successfully employed, could be utilized. Instead of using as sulphurizing agent free sulphur or sulphur dissolved in sodium sulphide (polysulphide) or in sulphite of soda (thiosulphate), it was tried to substitute these by a solution of sulphur in chloride of sulphur S_2Cl_2.

The processes described by Lauth for the preparation of Thionine were likewise tried, as well as the methods of introducing sulphur used in the preparation of methylene blue, i. e., the simultaneous employment of oxidizing agents and thiosulphate or polysulphide; for example, the use of ferric chloride along with polysulphide or of thiosulphate of soda and bichromate.

It is by processes of this kind that, by means of the thiosulphates or bithiosulphate derivative of para phenylenediamine reacting alone or with para phenylenediamine or other bodies, the syntheses of sulphur coloring matters were realized, which form the subject of this paper.

These experiments are interesting from a chemical point of view, inasmuch as they yield valuable indications regarding the constitution of the coloring matters of this series, and establish a direct relationship between the sulphur coloring matter and the coloring matters belonging to the class of Lauth's violet and methylene blue.

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It is now known that a large number of dyestuffs, such as the Thiocatechins, Vidal Black, Immedial Black, St. Denis Black, etc., are closely associated with this initial discovery.

It was very difficult from a chemical standpoint, taking into account the very complex nature of the raw materials treated with alkaline sulphides or polysulphides, to draw any conclusion as to the nature of the reaction which might explain it and permit of systematic improvements. In spite of these difficulties, the St. Denis Co. had reason to conclude that of all the vast array of aromatic substances, those substituted in the para position either by two amido (NH_2) groups or by one OH group and one NH_2 group are particularly suited for the preparation, by the action of alkaline sulphides or polysulphides, of substantive coloring matters, as M. Vidal had already discovered in the case of hydroquinon, an aromatic substance having two OH groups substituted in para position.

Seeing the impossibility of technically utilizing this latter discovery on account of the prohibitive price of hydroquinon, these researches were continued, and in 1893 the St. Denis Co. and M. Vidal patented a practical process which was subsequently carried out on a large scale for the preparation of new coloring matters, consisting in treating, either with sulphur alone or with sulphur and alkaline sulphides, para-amido phenol, paraphenyiene diamine, the amido naphthols, the diamido naphthalenes, the indamines, etc., or of compounds capable of yielding these substances. These coloring matters, which are produced by the same reaction as Cachou de Laval, differ essentially from the latter by the shade they yield, dyeing un-

mordanted cotton in various shades of black, which possess, like Cachou, great fastness to light, acids, and alkalies. These properties impart to them great technical value, and the success which they met with brought forth a large number of researches.

Two directions were open to those who aimed at improving the new discovery for their own advantage: the preparation and use of well-defined raw materials which had not been utilized up to the time, or a modification of the process employed.

The number of patents in which new raw materials are used is considerable; it was tried, for instance, to substitute for para amido phenol or para phenylene diamine various sulphonated amido hydroxyl or diamido compounds, such as the sulphonated amido phenols or amido naphthols, but these experiments do not seem to have met with much success. Other investigators substituted for the indamines, the use of which was claimed by the St. Denis Co., the indophenols, a class of bodies closely related to the indamines; others again used the diphenylamines containing at least two substituted groups which are nothing else than the reduction products of these same indamines and indopnenols. The use of these diphenylamines can scarcely be regarded as an invention, for if it be borne in mind that sulphide of soda is an energetic reducing agent, it is clear that the employment of diamido diphenylamine, for example, comes back to the employment of indamine, since this latter is transformed by reduction into diamido diphenylamine. Nevertheless a large number of diphenylamines, having at least two substituted groups in the para position, and containing besides sulpho, nitro, carboxyl groups, etc., have been prepared and utilized for the manufacture of black dyestuffs, but they cannot be considered to present any advantage as far as the quality of the coloring matters formed is concerned.

It should moreover be noted that the choice of these raw materials has in certain cases led to discoveries of great practical interest. Thus, for instance, the St. Denis Co. found that the use of amido hydroxyl or diamido compounds substituted in the para position usually gives rise to coloring matters which dye cotton directly, but in shades varying from yellow to brown. From this observation, which further enlarged the range of substantive sulphur colors by the addition of new shades, there resulted the discovery of the products manufactured by the St. Denis Co., under the name of Thiocatechines.

The second direction according to which investigators could hope to obtain substantive sulphur colors not covered by the patents was the discovery of a new process in which the raw materials, already successfully employed, could be utilized. Instead of using as sulphurizing agent free sulphur or sulphur dissolved in sodium sulphide (polysulphide) or in sulphite of soda (thiosulphate), it was tried to substitute these by a solution of sulphur in chloride of sulphur S_2Cl_2.

The processes described by Lauth for the preparation of Thionine were likewise tried, as well as the methods of introducing sulphur used in the preparation of methylene blue, i. e., the simultaneous employment of oxidizing agents and thiosulphate or polysulphide; for example, the use of ferric chloride along with polysulphide or of thiosulphate of soda and bichromate.

It is by processes of this kind that, by means of the thiosulphates or bithiosulphate derivative of para phenylenediamine reacting alone or with para phenylenediamine or other bodies, the syntheses of sulphur coloring matters were realized, which form the subject of this paper.

These experiments are interesting from a chemical point of view, inasmuch as they yield valuable indications regarding the constitution of the coloring matters of this series, and establish a direct relationship between the sulphur coloring matter and the coloring matters belonging to the class of Lauth's violet and methylene blue.

But they do not appear so far to have met with a great success from an industrial aspect; the direct methods still seem to be more advantageous from this point of view.

Whatever these sulphur coloring matters may be, and whatever improvements on the original patents they may be derived from, they all possess the same general properties, viz., those of Cachou de Laval. Like the latter, they are soluble in alkaline sulphides, and insoluble in acids; they dye unmordanted cotton directly from a bath containing sodium sulphide, and acquire by subsequent treatment with acids or certain metallic salts a degree of fastness which renders them extremely valuable and highly appreciated. The fact that a diversity of colors is obtainable in this way further increases the commercial importance of these dyestuffs.

These fundamental properties, inherent to all the coloring matters of this class, connect them with a common origin, viz., the discovery of Croissant & Bretonniere.

But another property which they have in common connects them still more closely with this discovery. Experience has shown that it is almost indispensable for obtaining a fine black dyestuff that the temperature of about 250° C. should not be exceeded.

If any of the known sulphur coloring matters is kept for a length of time at this temperature, or is heated for a shorter period to 350° C. (the maximum temperature in Croissant & Bretonniere's process), the coloring matter, while remaining soluble in alkaline sulphides, retains its substantive character, but invariably assumes a brown color more or less gray, or more or less greenish in shade, i. e., it inclines towards Cachou de Laval.

It appears therefore that these coloring matters, which are formed by successive groupings of aromatic nuclei, the simplest of such groupings corresponding to the diphenylamines and the more complex ones to the blacks or yellows, pass through successive phases, and ultimately if the molecule is subjected to the action of sulphides or polysulphides at a high temperature, reach a final condition, one might almost say a condition of stable equilibrium, Cachou de Laval.

—The zinc vat is used to a considerable extent both in England and on the Continent. It is a simple vat, and possesses one or two advantages over the copperas vat. It contains but little sediment, and the constituents form no insoluble compound with indigo. It is made up with indigo, zinc dust, and slaked lime, which may be used in the following proportions:—

Water .....1,000 galls.
Indigo .....30 lbs.
Zinc .....25 lbs.
Slaked lime.....25 lbs. to 30 lbs.

The mixture is well stirred during a period of 18 to 20 hours, and then allowed to subside. Iron borings or filings are added by some dyers to this vat. The zinc in the presence of lime decomposes water, forming zinc oxide. The liberated hydrogen then unites with indigotin to form indigo white. Unless care is taken the vat is liable to be muddy and frothy, due to the liberation of hydrogen, but this only takes place when there is an excess of zinc.

—In England the woad vat and the "hydrosulphite" vat are most largely employed. The former, which is the more important, is used principally for the dyeing of heavy cloth, and the latter chiefly for loose wool, slubbing, yarn, and lighter fabrics.

—Extract of Indigo is distinguished from vat indigo by the color being removed on boiling with a dilute solution of soda. On the addition of an acid to the solution the color is intensified and a piece of wool or silk may be dyed blue in it. Nitric acid gives a similar spot with extract of indigo as with pure vat indigo.

Improved Method and Machines for Coloring Cotton Yarns.

This new process and the apparatus employed have been invented and patented by John W. Fries, Winston-Salem, North Carolina, from whom we learn the following features.

The object of this process and the machines for carrying it into effect, is three-fold: First, to use the basic aniline dyes, without the usual tanning and antimony preparation, but by a method more simple, cheap and convenient than that usually employed for the direct, one-dip dyes, and at the same time to fix the basic dye on the fibre so as to avoid "bleeding." To use the direct dyes on the same machines by a slightly modified method for which a patent is now pending, so as to avoid bleeding on this class of substances also. It is well known that many of the direct dyes are now being fixed by the use of metallic salts, or by the process of diazotizing and developing; but then they are no longer properly "one-dip" dyes. It is not claimed that this process makes with any dye a better color than by methods already in use; but all of the dyes which have been used in practical operations in this new process to date have been quite as permanent as when dyed with sumac and antimony, and as a rule the shades are brighter and fuller.

It is well known that any color dyed in a concentrated bath and not rinsed, will lose all that was superficial, when it is first scoured. This is somewhat the case with this process; but after the superficial color has been removed the body color remains fixed in the fibre; and it is noticeable that what color is moved by scouring is in a precipitated condition and does not stain white and other adjacent colors appreciably.

The direct dye baths especially are not exhausted by dyeing one dip, and even when "standing baths" can be used for a number of batches, a very considerable waste is inevitable in the liquors which must be run off. This waste is avoided; only so much of the dye solution is used as is necessary to impregnate the yarn; any surplus is saved at full strength and consistency, and can easily be kept for future use; much more easily than a large vat full of diluted liquor.

THE FRIES PROCESS OF COLORING COTTON YARNS.

It is claimed to be demonstrated in practice that this method effects a material saving in the quantity of dyestuffs needed; that is, that the same depth of shade is made with considerably less dyestuff by this method

than in an old-fashioned vat or coloring machine.

Second: By this process each individual thread in the warp or filling chain is colored separately, and there is secured such uniformity of shade in the different threads, and in the length of each individual thread, as is unattainable by any other method. In fact this process does for the coloring of warp and filling chain yarn very much what was done for the sizing of warps when the modern slasher superseded the old rope size trough. Many manufacturers, who are not yet old men, will well remember the vexatious difficulty of beaming and weaving the average warp sized in the old-fashioned trough, and what an improvement in product and production came with the introduction of the slasher. Others will equally well remember the improvement secured in their mills by the introduction of the Scotch long chain system over the old short chain or hanks.

This improvement of Mr. Fries' is a long step in advance of the Scotch system.

Third: The prime object and advantage of this process and machine is the great saving in labor cost. Let us follow the ordinary long chain warp or filling ball through the various processes to which it is subjected in the dyehouse, even if it is not first bleached:—

First it is wet out	1	operation
Then doubled	1	"
Sumac, say three runs	3	"
Antimony	1	"
Rinsed	1	"
Dyed, four or more runs	4	"
Rinsed	1	"
Split	1	"
Dried	1	"
	14	

The warp must have careful attention during each of these operations, and the whole involves a very considerable amount of manual labor, to say nothing of the danger of tangling, breakage, or damage at every stage. To watch the process one can but wonder how it is possible that so delicate a thing as a fine, single cotton thread should at all survive such severe, long continued manipulation.

The yarn to be treated is spoken of at several places above as warp or filling chain, but it must not be understood from this that it is desirable to put it into the form of a linked chain. On the contrary, the inventor has always had in mind the fact that manual labor costs money, that the ideal method is to get stock through process and machines automatically.

The modern beamer or balling machine with automatic stop-motion delivers the threads from a creel full of spools in the cheapest and most perfect way known to best mill practice. In this process the yarn passes from the beam to and through the coloring machine, then over drying cylinders, and is then delivered in a dry condition into a box or sack, without having been handled by hand at all—the whole operation is as nearly automatic as possible. If the beam has been well made, it will run without stopping from end to end; every thread is delivered as straight as when it came from the creel—and the whole chain can be rebeamed or quilled without a hitch.

A single attendant can care for a number of machines; the operation is so cleanly that it can be conducted in the mill itself; and the space required is very small in comparison with dyehouse room.

Mr. Fries has selected for his sales agents, A. Klipstein & Company, of New York, with branches in Boston, Providence, Philadelphia, Chicago, and Hamilton, Ontario, who will be glad to give further particulars.

St. Denis Black V.

Sykes & Street, New York, are the selling agents for the St. Denis Dyestuff & Chemical Company, Ltd., Paris, whose new black dye, known as St. Denis Black V, has already obtained a reputation for coloring loose cotton and cotton piece goods, because of its slow oxidization to the air, levelness and cleanliness. The manufacturers of this product have placed it upon the market as an improvement on their Vidal Black, with which they have had such great success during the past few years.

QUESTIONS AND ANSWERS

Under this head we undertake to answer, free of charge, to the best of our ability, any pertinent inquiry pertaining to textile matters received from any regular subscriber to the TEXTILE WORLD. Questions should be stated as briefly and concisely as possible. Inquiries pertaining to textile processes, machinery, improvements, methods of management, the markets, etc., are especially invited, as well as any legitimate discussion on the views expressed. All inquiries must be accompanied by the name of the person inquiring, not for publication, but as an evidence of good faith.

Jobbers of Tape.

Editor Textile World:

Will you please send us the names of jobbers that buy and sell tape?

H. & K.

We have answered by mail.

Book on Loom Fixing.

Editor Textile World:

Where can I procure a complete manual of the weave room, practice in weaving, fixing, etc.?

C. H. S.

There is a book just published for overseers and fixers, entitled Woolen and Worsted Loom Fixers, by A. Ainley, that we should think would answer the wants of our correspondent.

Steel Head Jack Spools.

Editor Textile World:

Can you tell us of anyone making steel head jack spools?

Jack.

We believe they are not made now. They made a spool very heavy and had some serious disadvantages. A manufacturer recently related to us the experience that he had in the use of steel headed jack spools. The weight of the steel heads added so much to the weight of the spool that when the spool was turning on the mule and delivering the roping to the rollers, the momentum was so great that when the spool drum stopped, the spool itself continued its movement for a short time, causing the roping to double back on the spool, which caused a large amount of waste. This trouble was entirely remedied by removing the heavy steel heads and substituting lighter ones.

The Cost of the Wool in a Suit of Cloth.

Editor Textile World:

Please inform me what the wool costs, that is required for the cloth in an all-wool sack suit of medium quality. I am aware the answer to this question can be given only in an approximate way. Thanking you for any information you may give on the subject.

A. S. H.

The cost of wool, required for a suit of clothes, varies with the weight and quality of the goods and make up of the garment. Take a sack suit of cloth, weighing 22 ozs. per yard, made of clear ⅜ blood wool costing about 48 cents per pound scoured, we estimate the cost of the finished cloth at the mills as follows:

3¼ yds. woolen cloth for suit:
Cost of wool $2.78
Cost of manufacturing 1.70

Mill cost of suit $4.48

3¼ yds. worsted cloth for suit:
Cost of wool $3.22
Cost of manufacturing 2.01

Mill cost of suit $5.23

The difference between these figures and the retail prices is represented by trimmings, tailoring, profit, commissions, transportation, etc.

Bleaching with Bisulphite of Soda.

Editor Textile World:

Will you kindly furnish me with the best way to bleach woolen and cotton yarn with bisulphite of soda?

M. C.

In wool bleaching, the wool is immersed in a solution of bisulphite of soda 20° Beaume, and allowed to remain in this bath for about 12 or 15 hours. The wool is then taken out, and without any previous rinsing is immersed in a bath of sulphuric acid 4° Beaume about 12 hours. It is then rinsed in warm water and dryed. The same process is followed in the case of cotton, but the results are not as satisfactory as with wool, on account of the danger of injury to the cotton fibre by the sulphuric acid.

Instruction in Knitting.

Editor Textile World:

Do you know of any correspondence school that make a specialty of teaching knitting and finishing of seamless hosiery also fashioned hosiery?

—Commission.

There is no correspondence nor any other technical school in this country which teaches any of the branches of knitting. The articles which appear in the textile papers offer the best instruction at present available.

Other German Manufacturers Located in the United States.

In the March issue, we alluded to recent instances where German manufacturers had established plants in this country in order to meet the existing tariff conditions.

Still another instance is found in the establishment of the firm of Louis Walther & Co., in Philadelphia. This is a branch establishment of Mr. Ludwig Walther, in Zwickau, Saxony. Messrs. Louis and Emil Walther have both come over to this country to reside permanently, and take charge of the enterprise. The present house in Zwickau continues, as before, to be represented by George R. Oettel, who will also represent the American branch, accounts being financed by William Schroeder & Co. of New York. This is a dress goods plant, and the German house was established in 1825.

New Publications.

Collection of Designs for Textiles. By Hermias Busque-Gadbert. This work, printed in Spanish, may interest some of our readers. L'Industrie Textile says of it: "This volume, which contains 45 different collections of textile designs, forming a total collection of several thousand styles, and in the compiling of which several of the most important textile firms in Barcelona, Sabadall, Tarrasa, Vals and Alcoy, have assisted, merits a special mention, and we take pleasure in commending it to our readers' attention. It constitutes a work which can be profitably consulted by all manufacturers of novelties. The classification is well made, and has necessitated a vast amount of work, patience and textile knowledge. It is the most complete collection of designs that has ever appeared.

Textile Calculations. By E. A. Posselt, Philadelphia. Price $2.00. The fourth edition of this popular work has just appeared. The continued demand for the book is conclusive evidence of its value. The importance of correct and rapid methods of calculation in so complicated an industry as the manufacture of textiles is evident to all. The work is divided into four divisions, viz, Yarn and Cloth Calculations; Structure of Textile Fabrics; Analysis; Speed, Belting, Power, Etc.; and the calculations relating to each one of these subjects are explained clearly and in systematic order. The author will be pleased to send specimen pages on application.

Woolen and Worsted Loom Fixing, by Albert Ainley. 104 pages. Price, $1. The author of this work is a practical loom-fixer of many years' experience, and he has included in this book the result of this experience. Every practical mill man knows how much valuable knowledge is acquired by all mill workers, which is seldom if ever found in books, and to all of them, after the years have passed, comes the thought of what a great advantage it would have been if they had known these things at the beginning of their service. Manual skill and knowledge make the efficient loom fixer. No book can teach the first, and Mr. Ainley makes no such claim for his book; but the second can be so obtained, and every young man, desirous of becoming a loom fixer, should get as much knowledge as possible from the experience of others, because knowledge will come so slowly and laboriously, if he relies upon his own experience entirely.

The first chapter is devoted to the loom belt and friction pulleys; then follow chapters on the picking motion and shuttle binder. The causes, results and remedies of a loom banging off receives attention; filling and warp kinking is considered; a chapter is devoted to the filling stop motion; much space is wisely given up to the causes and remedies of shuttles flying out, box jumping, bobbin splitting, uneven weaving and goods shaded by faults in weaving.

In succeeding chapters the author treats of the head motion, putting warps in, adjusting and starting new looms, chain building, shuttles, selection of looms and the care of a section of looms.

The last chapter being a collection of short paragraphs on the general subject of loom fixing, which contains much of value.

It is a practical book written by an experienced and practical man.

Sent by Textile World on receipt of price.

Monopolies and Trusts, by Richard T. Ely, Ph. D., L.L. D., Professor of Political Economy and Director of the School of Economics, Political Science, and History in the University of Wisconsin. New York: The MacMillan Co. Price $1.25. This is a work of 273 pages on a subject of interest to all. It is carefully written and evidently the result of close observation. The author has demonstrated the fact that subjects of this character can be treated with clearness in a style attractive to the general reader. The book begins with a chapter on The Idea of Monopoly, followed by others on the classification and causes of monopolies; the law of monopoly price; the limits of monopoly and permanency of competition; the concentration of production and trusts; evils and remedies of trusts and monopolies. It is a timely work on a subject which is likely to claim an increasing share of public attention and will aid in a comprehension of causes and effects of trusts.

Jacquard Machinery, a work of 76 pages, issued by the Providence Branch of the Crompton and Knowles Loom Works. Although published to acquaint the trade with the jacquard weaving machinery made by this firm, it contains so much valuable information on the subject of Jacquard weaving, that it can be considered a text book on the subject. The various machines are clearly described and well illustrated by cuts. It will be useful to all interested in Jacquard weaving, and cannot fail to do much toward acquainting the trade with the general subject of Jacquard weaving, and the machines manufactured by this company.

Cotton. A monthly journal. Cotton Publishing Co., Atlanta, Ga. The first number of this journal has just reached us. As its name indicates, it is to be devoted to cotton, its utilization and products. It presents an attractive appearance and contains much of value to the trade. The illustrations of southern cotton fields and cotton mills are very interesting, and give the paper a wide-awake appearance. The journal is identified more especially with Southern industries and enterprise, and we wish it success.

Immedial Black and Blue. This is the title of a pamphlet on these dyestuffs, sold by Wm. J. Matheson & Co., New York City, for the dyeing of piece goods with Immedial Black and Blue. A jigger has been recommended, constructed in a manner to keep the material below the surface of the liquor. Practice, however, has lately proved that the dyeing can also be effected with an ordinary jigger.

Benzo Chrome Brown C R. This is the title of a color sheet, with samples, showing the use of these dyestuffs. The agents for it are Fabenfabriken of Elberfeld Company, New York City. This dye is chiefly to be recommended for the dyeing of yarns and piece goods, where great fastness to light and washing is required, as well as for fancy weave cottons, canvas, etc.

Substantive Colors on Cotton Sateen. This is the subject of a color card issued in book form, by the Berlin Aniline Works, New York City, showing how substantive colors on cotton piece goods are dyed according to three different methods, namely, in the jigger, in the open vat, and in the padding machine. We would suggest to dyers sending for this, which they can obtain upon application.

Heaters, Fans and Blowers. The American Blower Company, Detroit, Mich., has issued an illustrated catalogue, known as No. 110, relating to their A B C heaters, fans and blowers, for the heating and ventilation of public buildings, factories and stores, and the drying of all kinds of materials. If a manufacturer is contemplating the use of such an apparatus, we would suggest his writing for this catalogue. In fact, it would be well to have in hand, anyway.

Disc Ventilating Fans. This is the title of an illustrated catalogue, No. 111, of the A B C disc ventilating fans manufactured by the American Blower Company, Detroit, Mich. The illustrations and tables furnish much valuable information to manufacturers.

Compound Engines. This is the title of a pamphlet published by the Power Publishing Company, New York, as constituting a series of lectures by F. R. Low.

Fire Protection. This is the title of a pamphlet issued by the International Sprinkler Company, manufacturers of and contractors for automatic fire extinguishing apparatus, Philadelphia. This is a catalogue of this concern relating to fire extinguisher apparatus, etc., which they manufacture and install. The pamphlet describes the advantages possessed by this company, and tells what a sprinkler is and the proper system under which it should be installed. There is a great deal of valuable practical matter to be learned by the perusal of the descriptions and illustrations of sprinkler installations.

Industrial News.

—A. A. Lowe, of Brooklyn, N. Y., is erecting at Horseshoe, N. Y., a very elaborate plant for the manufacture of maple sugar. The construction will be fireproof, the buildings being entirely of steel, furnished by The Berlin Iron Bridge Company, of East Berlin, Conn., and covered with The Berlin Iron Bridge Company's patent anti-condensation corrugated iron roof covering.

—The Piedmont Cotton Mills, Clark's Cove, Ga., have placed their entire contract for machinery with the Howard & Bullough American Machine Co., Pawtucket, R. I. B. S. Willingham of Atlanta, is the agent of this new mill. Work will be commenced on the buildings at once.

—The Merchants' Sample Card Co., have removed to 33 and 35 Sullivan St., New York, near Grand, where they have larger quarters to meet their necessities.

—Cohoes Dye Works, Duncan & Baillie, proprietors, Cohoes, N. Y., have just added to their plant two Peel dryers for cloth, also three new tubs and one extractor. They will build a small storehouse outside the works for the purpose of storing either finished or unfinished raw stock, cotton and wool. They are very busy now, especially dyeing knit cloth, which is one of their specialties.

—Mr. W. F. Sherman, mill and mechanical engineer of Boston, has just returned from a business trip in the Southern states, where he is frequently called as consulting engineer on mill construction both for new plants and improvement of those now running. He reports great activity among the Southern mills, not alone in the building of new ones, but running both night and day, in very many localities, one noticeable result of which is a scarcity of operatives, which in many places already prevents realizing a full production.

—The Berlin Iron Bridge Company have had a very large experience, extending over long years in designing and building manufacturing plants, and they intend that this their own plant, shall be the most perfect and complete of its kind in the world. No pains or expense have been spared in making it such, and the company are now taking contracts to be built at this plant for delivery after July 1st. The capacity will be from 3000 to 4000 tons per month.

Wolstenholme & Clarke.

The above-named firm, composed of Alfred Wolstenholme and Albert J. Clarke, have a finely equipped mill at Baker and Mallory streets, North Manayunk, Pa., for spinning worsted and worsted merino yarns by the French

System for the knitting and weaving trade. The building covers 60,000 square feet, and has been fitted with entirely new machinery of the latest and best style, adapted for these yarns and imported especially for this firm. Both members of the firm have spent many years in the business, having been until recently connected with Messrs. Thomas Wolstenholme, Sons & Co., and are thoroughly practical men.

The mill will be run under their personal supervision and they will be ready to fill orders after June 1st, 1900. Their Philadelphia office is at 236 Chestnut street, where Thomas H. Ball is their representative.

Among their specialties will be sanitary and fancy mixes.

Frank Rittenhouse.

Mr. Frank Rittenhouse is an experienced engineer and machinist, who makes a specialty of building special machinery to order. He has good facilities for doing the work promptly and well. Manufacturers, requiring work in this line, and inventors, who desire to have their ideas carried out in a careful and intelligent manner, will do well to consult with Mr. Rittenhouse. He grinds gauges and standards at reasonable rates and carries on a general machine jobbing business in all its branches. His shop is at 2706 Hancock street, Philadelphia, Pa.; residence, 612 Swede street, Norristown, Pa.

Cling-Surface.

The Cling-Surface Mfg. Co. assure belt users that one of the great advantages which textile plants find in using Cling-Surface is that while they derive the benefits of the stoppage of all slipping of their belts, resulting in steadily, evenly running machines, the ease on belts, bearings and shafting, and the increase in power, they also claim they will be filling the belts with a perfect preservative, which keeps them pliable and elastic, preventing their becoming hard and dry and giving a belt at least thrice its ordinary length of life. This they state they are ready to prove by actual examples.

Duplicate Orders.

The Burt Mfg. Co., of Akron, Ohio, manufacturers of the Cross Oil Filters, recently entered their 12th order from the National Steel Co., 12th from the American Tin Plate Co., 9th from the American Steel & Wire Co., 7th from the Federal Steel Co., 4th from the Pittsburg Plate Glass Co., 4th from the Calumet & Hecla Mining Co., and duplicate orders from the Cambria Steel Co., Diamond Match Co., and National Cash Register Co.

Lea Electric Mfg. Co.

The Lea Manufacturing Company, manufacturers of the Lea enclosed arc lamps, and the Robinson Electric Heater Company, owners of the Robinson electric heating apparatus and rheostats, have been absorbed by the Lea Electric Manufacturing Company of Elwood, Indiana. The new company will increase its shop facilities so as to be able to keep up with the greatly increasing demand for the Lea arc lamp. It will put on the market a line of heating devices, rheostats and special resistances of a very novel character and using a new resisting material. Mortimer Levering of La Fayette, Indiana, is president; Jacob Loomis, of Elwood, Indiana, is vice-president and general manager; Conway Robinson, formerly of Baltimore, Md., is assistant manager and engineer, and H. H. Thacker of Elwood, Indiana, is secretary.

White's Striper.

A. White, 8 Western Ave., Lowell, Mass., is very busy on a large repeat order from the Otis Co. of Ware, for his four color striper. Mr. White claims that this is the only practical four color striper in the market. It knits stripes as easily and rapidly as plain goods, with no strain on the needles at any time, because no holding device for the yarn is required. Cotton, woolen and silk yarn or thread can be used at the same time, running as well as though all four yarns were of one kind, and either single or doubled yarn runs equally well. It knits a pattern with any number of courses from 40 to 80, and stripes through the whole number.

Experimental Work in Drying.

The Philadelphia Drying Machinery Co., 6721 Germantown Ave,, Philadelphia, have recently inaugurated an experimental department, where they have in operation a machine which is used exclusively for experimental work in drying. Even with their experience in the drying of all sorts of material, new problems are constantly presenting themselves. While the theoretical solution may be immediately suggested by previous experience, practical demonstration can only be satisfactorily carried out by actual work, and they have found this experimental apparatus of much value in such cases, and offer their services in this direction to those who may be interested and wish to avail themselves of such facilities now placed at their disposal for determining by practical tests the best course to pursue under new conditions.

Telephone Equipment.

Among recent orders of F. O. Plummer, 620 Atlantic Ave., Boston, is one from the Magid-Hope Silk Co., of Milford, Mass., which has placed contract with him for a telephone system. This system connects the offices with the various departments in the mill, and is becoming in more and more general use in mills and factories. The Magid-Hope Co. have also awarded contract to Mr. Plummer for a watch clock system.

Tanks and Vats.

The new plant of Geo. Woolford at Darby, Pa., on P. W. & B. R. R., covers more than two acres of ground, has on it two R. R. sidings. The main work

room is 150 feet by 120 feet, with ceilings 22 feet high, and is especially constructed for handling any size orders with promptness. Mr. Woolford has all improvements in modern machinery, much of which is of special design, and he can do any class of tank work in the most thorough manner. The yard is well stocked with cedar and cypress lumber direct from the mills. His city office is in the Real Estate Trust Building, S. E. corner Broad and Chestnut streets, convenient for all travel through the Pennsylvania Depot and the Reading Terminal and trolley lines.

Do You Know?

The Boston Belting Co. have issued a handy booklet entitled, "Do You Know?" in which the different goods this firm handles are catalogued for ready reference by the trade. Besides their extensive line of specialties in leather and rubber goods, a very large line of general supplies is classified, viz., diaphragms, golf balls, fire hose, rubber mallets, acid mittens, all kinds of rollers for cotton, leather, paper, wool and other industries and a general line of leather and rubber supplies.

Paint for Smoke Stacks.

The Joseph Dixon Crucible Co., Jersey City, N. J., believes in letting their goods speak for themselves. They ask all parties in need of a paint for any surface exposed to action of heat, such as boiler fronts, smoke stacks, etc., to send them a trial order for their Silica-Graphite Paint, and test by actual trial its durability under the action of heat and climate.

They have testimonials from a number of well satisfied users.

American Moistening Co.

Among the recent orders received by this company we note the following:—

The Everett Mills, Lawrence, Mass., giving the fourth repeat order and introducing this system in their Nos. 4 and 6 mills.

The Magid Hope Silk Mills, Milford, Mass.

The Eastman Kodak Co., Rochester, N. Y.

Whittenton Mfg. Co., Taunton, Mass., placing a repeat order.

The Barker Cotton Mills, Mobile, Ala.

The Scottdale Mills, Ingleside, Ga.

—The Woodstock Cotton Mills, Anniston, Ala., have placed their entire order for picking machinery, cards, drawing, spinning, etc., with the Howard & Bullough American Machine Co., Pawtucket, R. I.

—The Berlin Iron Bridge Co., of East Berlin, Conn., will remove their New York office on May 1st to the St. Paul Building, No. 220 Broadway. The office will continue to be in charge of Mr. Seymour N. Robinson, their New York representative.

International Sprinkler Co.

We have received the new catalogue of the International Sprinkler Company, whose works and main offices are in Philadelphia.

Mr. Clarke Merchant, president of Merchant & Co., Inc., is the president and inspiring spirit of this company, which was reorganized from a former concern that had been in the manufacture and installation of sprinkler work for a number of years. The progress that this company is making in every way is quite in line with the activity and capacity of the gentleman at its head.

The catalogue is a model of the printer's art, and outside of its typographical excellence it is a thoroughly business-like and detailed statement, covering the installation and manufacture of automatic fire extinguishing apparatus. It includes reproductions of the insurance approvals of the International devices, which make it perfectly plain that the great insurance companies and associations are entirely satisfied with the International system, and endorse it.

During the past six months this company has been taking numerous and important contracts for fire extinguishing apparatus all over the country, and we are at liberty to state with authority that it has doubled its business in this time.

Mr. Merchant makes the explicit statement that the company is in the field to stay, and as an indication of this, they are now engaged in the construction of a large new addition to their manufacturing plant, which will be completed early this summer.

The company owns valuable patents, which exhaustive investigation have convinced them are perfectly sound and original, and which have marked points of superiority over anything heretofore put on the market. The superintendent of the company, Mr. Frank McNamee, has been engaged in the manufacture and installation of sprinkler contracts for more than a quarter of a century, and has earned a wide reputation for workmanship of the best character.

Any one that is interested in the protection of any class of property from fire, is invited to correspond with the company, or to send inquiries to any of the offices or representatives of Merchant & Co., Inc. They will immediately have placed at their disposal a fund of information on this subject.

The recent great advance in insurance rates in all the large cities is an indication of the importance of equipping property of every class with automatic sprinklers, which method alone is a protection against an increase in fire insurance.

The record of all approved automatic sprinklers for saving property is really wonderful. The statistics of insurance companies show that the fire loss in buildings equipped with automatic sprinklers is less than 7 per cent. of the loss in buildings not so protected; hence the reduction of insurance rates 20 per cent. to 70 per cent. where mills and factories are equipped with sprinklers.

—The Howard & Bullough American Machine Co., Pawtucket, R. I., has received the entire contract for machinery from the Nokomis Mills, Lexington, N. C.

Reliable Patent Attorneys.

There are many irresponsible men in Washington who call themselves patent

solicitors, who advertise in every paper which will take their order without cash. The unfortunate experience of inventors with these unreliable parties should lead to careful discrimination in entrusting business to them. It is a pleasure for us to be able to endorse E. G. Siggers, of the National Union Building, as a responsible and skilled patent attorney. He has been 19 years in the business, and his clients number some very prominent inventors and manufacturers. He is familiar with textile work, and is in close touch with the patent office, which gives him facilities for prompt work for his clients.

The New Plant of the Berlin Iron Bridge Co.

The Berlin Iron Bridge Co., of East Berlin, Conn., have made an extensive purchase of real estate at Pittsburgh, Pa., and have already started on their new plant to be located at that point. They have bought fifty acres of land between the Pennsylvania Railroad and the Ohio River, upon which they will locate their plant, and in addition fifty acres back from the river, and upon this latter piece they will put up a number of houses for the use of their employees. The foundations for the buildings are now being put in place, and it is the intention that this plant will be in complete operation by the first of July, as the orders for the machinery equipment have been placed for some months.

The office building will be 60 feet square and four stories in height, and will be a fireproof construction throughout. The template shop will be 60 feet in width and 300 feet in length, two stories in height. The main shop will be constructed entirely of steel and glass, and will be 220 feet in width and 700 feet in length. The entire plant will be equipped with new machinery, which will be of the heaviest and most modern design, and the orders have been placed with the Hilles & Jones Co., of Wilmington, Del., the Cleveland Punch & Shear Works Co., of Cleveland, Ohio; the Niles Tool Works Co., of Hamilton, Ohio, and the Brown Hoisting & Conveying Machine Co., of Cleveland, Ohio.

The hydraulic plant will be very elaborate, and will be furnished by Wm. H. Wood, of Media, Pa. The floor surface of the main shop is to be controlled by twenty-three traveling cranes, of various sizes and design, of the heaviest capacity, all furnished by the Chisholm & Moore Mfg. Co., of Cleveland, Ohio. The fuel used will be natural gas, the engines being furnished by the National Meter Co., of New York, N. Y. The machinery will be operated throughout by electricity, the generators and motors being furnished by the General Electric and Westinghouse people.

Persons Seeking Homes.

Persons seeking homes or investments, or firms and corporations seeking locations in the South and who desire information about Tennessee would do well to address Robert Gates, special industrial and immigration agent, Louisville & Nashville R. R. for Tennessee, at Nashville, Tenn.

One Way of Booming New England.

In its mission of promoting and bringing New England into prominence as a vacation and tourist resort, the Boston & Maine Railroad endeavors to place before the public descriptive matter that is interesting, instructive and authentic.

The illustrations used in the various publications are from pictures taken expressly for the Boston & Maine Railroad by one of the most noted landscape photographers in the country and are veritable works of art.

Last year three portfolios were added to the list of illustrated publications which bear the following titles: "New England Lakes," "New England Rivers" and "Mountains of New England." These portfolios are half-tone reproductions, 4 by 6 inches in size. For the present season two additional portfolios have been prepared, namely: "Sea Shore of New England," and "Picturesque New England" (Historical-Miscellaneous).

In the Sea Shore Portfolio, among the thirty odd views of the rugged New England shore is a distant outline of Grover's Cliff, at Beachmont. In the vicinity of Marblehead are pictures of the surf and of the ancient wharves and of scenes in the harbor; then there is a picture of the "Singing Beach" at Manchester on the North Shore. Gloucester affords a variety of scenic display which depicts harbor and shore scenes. Further down the shore are vistas of picturesque surroundings at Ipswich Bluff, in the vicinity of Newburyport and at Salisbury. Of Hampton Beach and the Isles of Shoals there are several views, as well as York Beach. Likewise of Kennebunk and Old Orchard there are several delightfully pleasing representations of familiar places.

The Picturesque New England Portfolio is indeed one of the most interesting of the series, as it treats of a variety of subjects with which all are acquainted. Pictures are shown of the birthplaces of Whittier, Hawthorne, Rebecca Nourse, Horace Greeley, and President Pierce, while the revolutionary reminders include illustrations of the Munroe Tavern, the Monument and Minute Man Statue at Concord, Mass.; the Governor Craddock House at Medford; and General Gage's Headquarters. The Colonial period is suggested in a collection embracing illustrations of the Frary House, the Governor Wentworth Mansion and the Hannah Duston Monument. The rural districts are attractively displayed in numerous views of inland scenes in the vicinity of Hadley, Lancaster and Groton, Mass., and Charlestown, N. H.

Either one or all of these five Portfolios can be obtained by sending six cents in stamps for each book to the General Pass. Dept., B. & M. R. R., Boston, Mass.

—The Royal Bag Mfg. Co., of Charleston, S. C., have sent us a very attractive advertising novelty in the way of a leather pocketbook and card case, an attractive way of keeping themselves in customers' minds.

—The Aurora Cotton Mills, Burlington, N. C., have placed a large repeat order for picking machinery, cards, drawing, speeders and spinning frames with the Howard & Bullough American Machine Co., Pawtucket, R. I.

MILL NEWS.

Cotton.

New Mills.

—*Alabama, Anniston. The Adelaide Cotton Mills has been organized and work has been started on construction of building. This is the plant in which Messrs. Robinson are interested. Contract for machinery has been let to the Howard & Bullough Am. Machine Co.

—*Alabama, Anniston. The Woodstock Cotton Mills have been incorporated at this place and now have a new mill under construction. John H. Noble is president; James Keith, Jr., secretary and treasurer and J. B. Goodwin, W. L. McCan and William Noble, directors. Orders for the machinery have been placed with the Howard & Bullough Am. Machine Co., Pawtucket, R. I.

—*Alabama, Columbiana. The Columbiana Mfg. Co., which we previously reported incorporated with capital of $50,000, Gordon DuBose, president, will equip their mill with 5000 spindles for manufacturing hosiery yarn, No. 26. The plant will be operated by steam, and will begin about Jan. 1st, 1901.

—Alabama, Girard. The Girard Cotton Mills has been organized and are equipping building, recently secured, with 138 looms for making colored goods.

—*Alabama, Gunsterville. E. O. Neely will be manager of the Guntersville Cotton Mill Co., recently incorporated with capital of $60,000 to manufacture coarse yarns, 4s to 14s. Work will be started on foundation during the summer, so that plant will be ready to start operations by next fall. The mill will be operated by steam and have equipment of 2,500 to 3,120 spindles.

—*Alabama, Roanoke. The W. A. Handley Mfg. Co. has been organized with W. A. Handley, president; Major Schuessler, vice-president and Z. J. Wright, secretary and treasurer. They have purchased a site and will erect a 10,000 spindle cotton mill, although but 5,000 spindles will be installed at first.

—*California, Oakland. A recent report states that the new yarn and thread plant, previously reported by us at Alameda, will now be located at this place. Site has been purchased and work will begin at once on construction. It is expected that employment will be given to about 100 people.

—*Georgia, Atlanta. B. L. Willingham is president, W. Woods White, treasurer and Baynard Willingham, manager of the Piedmont Cotton Mills, which will be erected here, for manufacturing 14/2 warp yarn. The plant will have a capacity of 5,000 spindles, although only 2,500 will be installed at first. Contract for the machinery has been let to the Howard & Bullough American Machine Co.

—Georgia, Baldwin. The Baldwin Cotton Mills have been organized with capital stock of $60,000, W. A. Shore, president; W. D. Lewis, vice-president; R. L. Thomas, secretary and Mr. Duckett, treasurer.

—*Georgia, Carrollton. E. M. Bass, who is associated with E. G. Kramer, J. C. Bass, O. L. Reeze and others, informs us that as yet no company has been formed for a new cotton mill, but that work will start on construction about July or August, for a 6,000 spindle yarn mill, in which they will install looms later.

—*Georgia, Cordele. The Cordele Cotton Mills Co. has been incorporated with capital of $50,000, with J. T. Westbrook, as president; L. C. Averett, treasurer and superintendent, and R. L. Wilson, agent. They will manufacture yarns, expecting to begin operations about November 1st. The plant, which will be operated by steam, will be equipped with 3,600 spindles.

—*Georgia, Cordele. A suitable building has been secured and R. L. Wilson and J. T. Westbrook of this place, will place contract for installing 4,500 spindles. This project was previously mentioned.

—Georgia, Cornelia. A $100,000 cotton mill company has been formed with I. T. Sellers, president; James Peyton, vice-president; Dr. D. A. York, secretary and J. T. King, treasurer, for purpose of erecting a mill.

—*Georgia Gainesville. About $60,000 have been subscribed toward the $100,000 required for the proposed new cotton mill at this place. The mill will be known as the Woodside Cotton Mills. Jno. A. Smith and Lester D. Plunkett are interested.

—*Georgia, Hampton. We have been informed by A. J. Henderson, president of the Hampton Cotton Mills, recently incorporated with capital of $60,000 that work will be started at once on erection of buildings, in order to have the plant ready to begin production about Jan. 1901. Although only 3,000 spindles will be installed at first for making hosiery yarns, 8s to 30, the mill will be built with view to increasing to 5,000.

—*Georgia, Monroe. Plans are now being made for the new Walton Cotton Mill, in which H. D. McDaniel and T. J. Avery are interested. The mill will be built to hold capacity of 5,000 spindles, but they will begin operations with only 2,200 and the necessary looms. The capital stock is placed at $75,000.

—*Georgia, Tifton. The Tifton Cotton Mills, which have been incorporated with capital of $75,000, H. H. Tift, president; L. G. Maynard, treasurer and W. S. Witham, agent, will probably make fine yarns and equip the plant with 5000 spindles.

—*Georgia, Winder. The Winder Cotton Mill has been organized with capital of $75,000 for purpose of erecting a cotton mill. W. B. McCants, is president; T. A. Maynard and J. C. DeLaperriere, vice-presidents. The stock has all been subscribed and work will begin at once on construction.

—*Louisiana, Shreveport. Jules Dreyfuss was elected president; Leon M. Carter and H. H. Hargrove, first and second vice-presidents respectively; John W. Taber, secretary, and Ben Holzman, treasurer of the Hargrove Cotton Mill. The machinery has been ordered, but bids are now being received on construction of buildings, etc.

—*Mississippi, Lexington. The Lexington Cotton Mills, which we recently reported as proposed with capital stock of $125,000 expect to begin work on construction at an early date. They have not yet fully decided what will be manufactured, but will have a plant of 5,000 spindles. This is the plant in which G. A. Wilson and others are interested.

—*New Jersey, Camden. The William Handley Webbing Co., previously mentioned at Trenton, with capital of $20,000, will manufacture ventilated suspender webbing, etc. Wm. Handley is president and J. Harry Shinn, secretary and treasurer.

—*New York, West Utica. The plant of the Utica Spinning Co. is nearing completion. The mill will have a capacity of 30,000 spindles. It is expected to start the mill in a small way June 1st, and to have it in full operation two or three months later. The machinery is now being installed.

—*North Carolina, Laurinburg. The new cotton mill in which T. C. McEachern is interested, will be known as the Sexton Cotton Mills, with capital of $50,000. John F. McNair is among the incorporators.

—*North Carolina, Lexington. Contract has been awarded to D. K. Cecil, for erection of the Nokomis Cotton Mills buildings. The main structure will be 75x360 feet, 2 stories, and will be equipped with 10,000 spindles and 340 looms. Employment will be given to about 300 people.

—*North Carolina, Mt. Pleasant. The new mill to be established at this place will be known as the Tuscarora Cotton Mills, with capital of $45,000, privilege of increasing to $150,000. The mill will be equipped with 3000 spindles for manufacturing cotton yarns. A. N. James, at present with the W. R. Kindley Mills, will be manager. Work will soon be started on erection of the buildings.

—*North Carolina, Raleigh. Work on the buildings of the Neuse River Mills are now nearing completion and it is expected that the plant will be put in operation during June.

—*North Carolina, Sanford. Work will be started during May on structure of new buildings for the Calmacha Cotton Co., recently incorporated with capital of $100,000. H. P. McPherson, Truman Chapman, W. W. Caldwell and T. C. Wilson, are interested. The plant will be equipped with 10,000 spindles for manufacturing yarns.

—*North Carolina, Warrenton. E. S. Allen is now receiving estimates on machinery for a 5,000 spindle plant proposed at this place.

—Ontario, Hamilton. The Imperial Cotton Company has been incorporated with capital stock of $750,000 for purpose of establishing a cotton factory here.

—Rhode Island, Bristol. The Dixon Yarn Mills have been incorporated by Ezra Dixon, W. C. Pierce, J. A. Knight and F. M. Dixon, with a capital stock of $250,000. A new mill will be erected for manufacturing, dyeing, printing and finishing cotton and wool fabrics. The town has exempted the concern from taxation for a period of ten years.

—*Rhode Island, Woonsocket. It is reported that the new weave shed of the Social Mfg. Co., now under construction, will be equipped with 1000 looms, and that 800 looms in the Nourse Mill will be transferred to the new plant. The Nourse Mill will be used as a yarn mill only.

—*South Carolina, Batesburg. The company which has purchased the Batesburg Cotton Mill, will operate it under the name of The Middleburg Cotton Mill, capital stock of $75,000. W. P. Roof is president; O. H. Foster, vice-president and Allen Jones, secretary and treasurer.

—*South Carolina, Cowpens. The Mary Louise Mill, which has recently been incorporated by B. E. Wilkins, who is president and treasurer, and A. L. Quinn, superintendent, will manufacture coarse yarns, operating 1040 spindles. Steam and water power will be used.

—*South Carolina, Greer's Depot. The new mill to be erected at this place will be known as the Franklin Mills, with W. W. Burgess, as president and treasurer. The mill, which will be capitalized at $100,000, will be equipped with 5000 spindles for making coarse yarns.

—*South Carolina, Greenville. Joseph Norwood, president of the Carolina Mills, which we mentioned in a previous issue, informs us that they expect to begin operations about August 1st, making yarns, 20s to 30s, operating 3120 spindles. P. C. Poag is treasurer.

—*South Carolina, Liberty. Estimates on the cost of machinery, etc., are now being received by R. F. White, president of the Liberty Cotton Mills, recently incorporated with capital of $100,000.

—South Carolina, Rock Hill. A new mill costing about $50,000 may be erected and put in operation by J. C. Harrington, of New York. Towels will be manufactured. The Commercial Club is interested in the new enterprise.

—*South Carolina, Seneca. The Seneca Cotton Mills, now under construction, will enlarge the plant for an equipment of 35,000 spindles and 1200 looms, instead of 10,000 spindles and 300 looms as at first planned. The capital stock will be increased to $400,000.

—South Carolina, Verdery. The Verdery Cotton Mills have been incorporated with capital of $100,000 by W. E. Henderson, H. D. Pressley, Geo. W. Foster and J. W. Scott.

—*South Carolina, Weinona. The new cotton mill which we reported in a previous issue under Aiken, and in which C. Warren Davis of Augusta is interested, will be known as the Weinona Cotton Mills. The mill will be equipped with 5000 spindles for manufacturing yarns, numbers 6 to 14.

—*South Carolina, Williamston. We have been informed by G. W. Sullivan, secretary and treasurer of the Williamston Mills, that the company has been organized with capital of $200,000 and that a 10,000 spindle mill, with room for 5000 more, will be built. Print cloths, 64 by 64 will be made in the plant, which will be operated by steam and electric power. W. B. Smith Whaley & Co. are the engineers and architects.

—*Texas, Corsicana. Contracts have been let by the Corsicana Cotton Factory Company, recently organized, for erection of a $15,000 building, 110 by 220 feet, 2 stories. The mill will be equipped with 5000 spindles.

—Tennessee, Chattanooga. A. S. Hamilton, president and treasurer of the Trion Factory (Ga.) Cotton Mill, is interested in erection of a large cotton mill at this place, and has offered to subscribe $350,000 worth of stock toward a cotton mill capitalized at $500,000, if they would secure $150,000. A committee, under auspices of the Chamber of Commerce, has secured the requisite amount.

—*Tennessee, Fayetteville. Orders are being placed for the machinery, etc., for the 5,000 spindle mill to be erected at this place by the Elk Cotton Mills, incorporated with capital of $100,000, R. D. Warren, president; H. K. Holman, vice-president; C. B. Bagley, general manager and R. A. Rees, secretary and treasurer. This project was erroneously reported under North Carolina, in our issue of March 16th. Cotton yarns and warps to be manufactured.

—*Tennessee, Harriman. The Harriman Cotton Mill Co., in which W. B. and J. S. Crinkley are interested, has purchased a 3-story factory building at this place and erected a picker room, 58 by 56 feet. They will manufacture cotton yarns, warp Nos. 8 to 16 and Nos. 20 to 36. They expect to begin operations about June 1st, with 7000 spindles, using steam for motive power. The engine and boilers have already been placed, and they are now installing the other machinery.

—*Texas, Bonham. The Bonham Cotton Mills has been incorporated with capital stock of $150,000, Hugh Halsell, president; C. L. Bradford, treasurer, and J. C. Saunders, manager. They will manufacture cotton sheeting and have an equipment of 7500 spindles. None of the machinery required has yet been purchased.

—*Texas, Hillsboro. Work will be started about July 1st, on construction of building for the Hillsboro Cotton Mills Co., with authorized capital of $100,000. The plant will have an equipment of 5,000 spindles for manufacturing yarns, ducking and sheetings. Steam will be motive power. Production of goods will begin about Oct. 1901.

—*Texas, Itasca. Bids on the machinery, etc., for the proposed cotton mill, are now being received by the company, of which W. H. Webb, is president.

—*Texas, Longview. We have been informed by B. F. Lewis that the people at this place, who have already subscribed $22,000 toward some manufacturing enterprise, are now considering project of a yarn mill and would like to correspond with parties who can give them practical aid in all directions, pertaining to such a plant, equipped with the latest improved machinery.

Enlargements and Improvements.

—Canada, Montreal. The Montreal Cotton Co. is now making extensive additions to its electrical power house, which will develop 3,000 h. p., part of which will be utilized for operating their new mill, with equipment of 1,000 looms and other necessary machinery. It is expected to have the new machinery in operation about July 1st.

—Connecticut, Rockville. The Hockanum Company will enlarge their plant by erecting an addition, 50 feet long, one story high.

—Connecticut, Windsor Locks. An additional story is to be added to the J. R. Montgomery's plant to be used for mercerizing yarn.

—Georgia, Atlanta. Plans are now being prepared by the Fulton Bag & Cotton Mills for an addition to their plant, in which they will install 25,000 spindles, with looms, for consuming the yarn produced.

—Georgia, Elberton. An annex is now under construction to the Swift Cotton Mill. It will be utilized for twisting yarns.

—*Georgia, Jackson. The annex now being erected by the Pepperton Cotton Mills will be 100 by 270, 2 stories, for accommodation of spindles reported in previous issue.

—Georgia, Roswell. The Roswell Cotton Mills Co. have issued $75,000 in bonds and will either erect a new mill or greatly increase the capacity of the present plant.

—*Massachusetts, Easthampton. Plans are now under consideration by the Glendale Elastic Fabrics Company for a new mill, 110 by 50 feet, 5 stories, in which they will install new looms. An electric lighting plant will also be installed for lighting all the mills.

—*Massachusetts, Fall River. Work has been started on construction of new weave shed for Staffard Mills.

—Massachusetts, Shirley. The C. A. Edgarton Mfg. Co. contemplates building a two-story addition to its factory.

—*New Jersey, Millville. About 200 new looms are now being installed in the new weave shed of the Millville Manufacturing Company, recently completed.

—*North Carolina, Asheville. An additional building, 175 feet long, three stories high, is to built to the Asheville Cotton Mills. Part of the new machinery has been ordered. The capacity of the mill will be greatly increased.

—*North Carolina, Lexington. The Wennonah Cotton Mills, will be enlarged by an addition, 75 by 48 feet, 3 stories high.

—*North Carolina, Morganton. The Alpine Cotton Mills inform us that the new structure which they will erect will be ready for next season's crop, and will be equipped with 7,500 new spindles, for making No. 20s two ply yarn and warps.

—*North Carolina, Spray. The Lily Mills, which have begun operations, are now considering making further enlargements to the capacity of the plant.

—Pennsylvania, Conshohocken. The J. Ellwood Lee Co., manufacturers of absorbent cotton and medicated gauze, have absorbed the Syracuse Suspensory and Bandage Company. An addition will be built to their plant to accommodate the newly acquired machinery.

—Rhode Island, Providence. A large addition is being built to the Fletcher Mfg. Co.'s cotton mill.

—*Rhode Island, Woonsocket. We have been informed by the Social Mfg. Co., that the new weave shed, which they are now erecting, will be equipped with about 1500 looms.

—Rhode Island, Woonsocket. An addition, 230 by 106 feet, one story, to be used for carding and spinning, will be erected by the River Spinning Co. Plans are now being drawn and it is hoped to have the annex running in about three months, giving employment to 50 additional people.

—*South Carolina, Fountain City. We have been informed by C. E. and R. L. Graham, of Greenville, S. C., who purchased the Fountain Inn Mills, that they will add from 2000 to 3000 spindles to the mill.

—South Carolina, Rock Hill. Two thousand five hundred spindles are being installed in the Victoria Mills.

—South Carolina, Rock Hill. A new building, 85x225 feet, and a power house, 45x80 feet, will be erected by the Manchester Cotton Mills. They will install 7,000 new spinning spindles and 3,500 twister spindles in the addition. About $135,000 will be expended on the enlargements.

—South Carolina, Tucapau. An addition is to be built to the Tucapau Mills. When finished 10,000 spindles will be installed.

—South Carolina, Yorkville. The Sutro Cotton Mills are making enlargements and additions to the plant.

—Tennessee, Columbia. It is reported that arrangements are now being made by the Columbia Cotton Mill Co. for enlarging the plant. R. G. Sparrow is treasurer.

Mills Starting Up.

—*Connecticut, Baltic. The Baltic Power Co., owned by F. C. Sayles, Nathan R. Gardner, resident agent, is expected to begin operations about July 1st in the rebuilt Baltic Mill, completed in 1898 but not equipped then with machinery. They contemplate installing 80,000 spindles and 2000 looms for making fine cottons.

—*Rhode Island, Greenville. The machinery is all set up in the Winsor Cotton Mill and the plant ready for operation..

—*Rhode Island, Woonsocket. Operations have been started in the Harris Privilege Mill, now owned by the Lawton Spinning Company. The mill will be running in full in a short time.

—*Tennessee, Chattanooga. Operations have been started in the Richmond Spinning Mill at East Lake.

—Tennessee, Memphis. The old Pioneer Cotton Mill, which has been idle for sometime, has been leased by J. A. Pinchback and J. A. Smith, who will make changes in machinery equipment and put the plant in operation in about 3 weeks. Mr. Pinchback will be the manager.

Woolen.

New Mills.

—New Jersey, Camden. The West Jersey Iron Works at Railroad Ave. and Vanhook St. have been leased by Messrs. Craven and Cohen and fitted up with improved machinery for manufacturing Smyrna rugs, mats, carpets, etc. Employment will be given to about 150 people. Mr. Craven was formerly with the Fries, Breslin Co.

—*New York, Amsterdam. Work will be started soon on erection of a new mill, 80 by 190 feet, 3 stories, for the Mohawk Mills, McCleary, Wallin & Crouse, proprietors.

—*New York, Binghamton. A recent report states that General Edward F. Jones, Henry H. Norton, Henry C. Hermanns and Paul S. Ross are interested in forming company for manufacturing felts. It is the intention of those interested to purchase the hoe factory building and remodel it. Andrew Kurtzner, for some time with the Faatz Bros., factory at Lestershire, will be superintendent.

—*North Carolina, Charlotte. James Wallworth & Sons, who are interested in the Charlotte Waste Company, recently reported at this place will operate the new mill to be erected in connection with their plant at Upland, Pa.

—Pennsylvania, Philadelphia. Louis Walther & Co. is a new concern which will locate at corner of Third and Lehigh Avenues, manufacturing dress goods. Emil and Ludwig Walther, who are interested in firm at Saxony, will also be identified with the new company.

—Pennsylvania, Philadelphia. William Spink and William A. Flanagan have purchased the Lincoln Mill, formerly part of the Wallace Estate and have leased the second and third floors to Platt Bros., who will manufacture carpet yarn for the trade. The Messrs. Platt, John W. Jr., Horace M. and Frank H., are sons of the late John W. Platt, Sr., who was connected with the firm of A. Platt & Bros. It is expected to have the plant in operation during May.

—*Rhode Island, Pawtucket. Daniel A. Everly, formerly of North Adams, Mass., is manager of the new concern which is to be located here in the old Slater Mill, and will manufacture cotton warp woolen goods.

—*Rhode Island, Woonsocket. A new building, 50 by 70 feet, 3 stories, will be erected by Theophile Guerin, who is operating a new plant, known as the Falls Yarn Mill, now located in building recently purchased by Sayles & Gilleran on South Main Street. The plant is now equipped with 4 sets of cards and 2800 mule spindles for spinning woolen and merino yarn (Belgium system). Joseph Cavedon is also interested.

—Rhode Island, Woonsocket. The Dunn Worsted Company, which now leases the plant in which they are located, it being the upper mill of the Jenckesville Mill Co.'s property, will purchase the same. They have also purchased adjoining land and will build a new mill in addition to present building this spring.

Enlargements and Improvements.

—Connecticut, Meriden. Contract for extensive additions and repairs to be made to the woolen mills of Rawitzer & Bros. has been let to Albert E. Converse.

..*Connecticut, Rockville. An addition, 60 feet long, five stories high, will be built to the main mill of the American Mills Co. They now have under construction a new dye house.

—Georgia, Atlanta. Extensive additions and improvements are being made to the plant of the Atlanta Woolen Mills Co. They are now installing 5000 spindles for a cotton department, and installing additional woolen machinery, doubling the present capacity. The mill has been shut down, while a new 600 h. p. engine is being set up.

—Georgia, Rossville. The Park Woolen Mill, of which W. A. Campbell, is treasurer, contemplates erecting an annex for spinning cotton to be used in the manufacture of certain grades of pants goods.

—*Massachusetts, Collinsville. Work will be started at once on rebuilding the part of the Collinsville Mills, recently destroyed by fire.

—Massachusetts, Franklin. Work will be started at once on erection of a new plant at Unionville, for the Norfolk Woolen Company. The old plant is to be torn down and the new one which will be 2 stories, built instead.

—Massachusetts, Great Barrington. Repairs and additions are to be made to the Endrick Woolen Co.'s mill, leased by Hugh Sheridan, who has recently had his lease renewed.

—Massachusetts, Lawrence. It is reported that a new building will be erected this summer by the Washington Mills. The room occupied by the woolen, card and mule spinning departments, which have been transferred to Collinsville, will be equipped for a warp drawing and winding room.

—Massachusetts, North Oxford. The Rhodes Mill, formerly operated by John Rhodes, of Millbury, which has been idle for some time, has been purchased by the Thayer Woolen Company. The mill will be equipped with machinery and run in connection with the Texas Mill.

—*Massachusetts, Oxford. Work has been started on erection of David N. Taft's weave shed, about which we have made previous mention.

—New Hampshire, Somersworth. An addition for purpose of increasing their facilities will be built to the Great Falls Woolen Co.'s mill at New Dam.

—New York, Amsterdam. Eight sets of cards are to be installed in Stephen Sanford & Sons' carpet mills.

—New York, Newburgh. Four sets of cards are being installed in the Stroock Felt Co.'s Mill.

—*North Carolina, Greensboro. The Van Deventer Carpet Co. will install 50 additional looms.

—Rhode Island, Centreville. The Kent Mfg. Co. has recently completed their new weave shed and installed 20 new looms. They will add more looms later.

—Rhode Island, Manton. The Manton Mills of the American Woolen Co. are being enlarged. New rooms are being erected to the weaving department. When additions are completed work will be given to a number of additional hands.

—Rhode Island, Manville. An addition, 75x40 feet, is now being added to the Contrexville Mill Co.'s plant.

—Rhode Island, Wickford. The Wickford Worsted Mills are to install six new cards shortly.

—*Rhode Island, Woonsocket. The River Spinning Co. informs us that they will install 5 new sets of cards (woolen) in the addition now under construction.

—West Virginia, Martinsburg. The Martinsburg Woolen & Cassimere Company, which has recently increased the number of looms in the plant, doubling the capacity, is now adding other machinery.

Mills Starting Up.

—Tennessee, Jackson. The Jackson Woolen Mills, B. P. Cantrell, treasurer and manager, will be put in operation again after a two months shut down owing to differences with the employees.

—*Tennessee, Knoxville. Operations have been resumed in the Knoxville Woolen Mills.

Knit.

New Mills.

—*Georgia, Valdosta. It is reported that the capital stock of the Tillman Mfg. Co., recently incorporated and in which H. Y. Tillman, is interested, will be increased $30,000 for purpose of building a small yarn mill to supply the knitting plant with necessary yarn.

—*Indiana, LaFayette. Mortimer Levering is president, B. F. Cavins, treasurer, and R. E. Hill, superintendent of

the LaFayette Underwear Co., which has commenced operations here with capital of $60,000. They manufacture men's fine ribbed and flat knit underwear, Patent union suits a specialty. The plant is equipped with 37 knitting machines and 51 sewing machines and is operated by steam.

—Maryland, Laurel. A recent report states that A. H. & W. E. Cobb, proprietors of the Suffolk Knitting Mills, Suffolk, Va., are considering the project of establishing a branch mill here.

—Massachusetts, Easthampton. The Ionic Knitting Co.'s machinery will be removed to Henderson, N. C., where it will be installed in a plant to be operated as the Seaboard Knitting Mills, about which we made mention in issue of March 23d.

—*Michigan, Owosso. William McAlpine, proprietor of the new Owosso Knitting Mills, writes us that he starts up April 9 with six machines at first, to make hosiery and underwear. He expects to increase the capacity of his works from time to time, and would like to hear from builders of hosiery and underwear knitting machinery with catalogues. He will also buy cotton, silk and lisle thread yarns, for which he has not yet established connections.

—New Hampshire, Plymouth. A meeting will be held on May 1st., to see if the town will vote to exempt from taxation, for a period of ten years, the mill proposed at this place by Draper & Maynard Co., for making gloves, mittens and sporting goods.

—*New York, Poughkeepsie. The Lindenwald Mills, C. F. Hoag, proprietor, Kinderhook, N. Y., have accepted inducements offered and will establish a mill at this place, making sweaters, leggings, toques, mittens and fancy goods. Ten new knitting machines will be installed giving a total of eighty-five. Mr. Hoag, will operate both mills.

—North Carolina, Laurinburg. It is reported that a hosiery and underwear mill will be established here by N. Hammond.

—*North Carolina, Raleigh. Site has been purchased for building the new Melrose Knitting Mills, which we have previously mentioned, and work will be started on erection of a two-story building. Frank T. Ward was elected president to succeed Charles E. Johnson, who resigned.

—North Carolina, Tarboro. Job Cobb, Geo. Howard, Jr., D. J. M. Baker, W. H. McNair and others are interested in another knitting mill to be established at this place. A company has been organized with capital of $20,000 (privilege of increasing to $100,000). They propose having building completed by time machinery is ready, orders for which are now being placed and which they expect in about four or five months.

—*North Carolina, Weldon. The Weldon Mfg. Co., which we previously reported contemplated erecting a spinning mill, will expend about $60,000 for that purpose and will construct a building, 54 by 112 feet, 2 stories high. They will install 2000 spindles.

—*Pennsylvania, Columbia. The new knitting factory, about which we made mention in our last issue, will be established by P. S. Brugh and will be started with about 50 knitting machines. He expects to get the plant in operation about June 1st and anticipates increasing to at least 150 machines. He will not install a dyeing plant at present.

—*Pennsylvania, Downington. Work has been started on addition to the Evans & Walker Hosiery Co.'s plant, which was destroyed by fire March 21st. It is expected to have plant in operation during May, with a total of 40 knitting machines.

—*Pennsylvania, Honesdale. Brown & Blakeley, reported some time ago as establishing a knitting mill here, now operate 6 knitting and 12 sewing machines on ladies' underwear. Critten, Clift & Co., are the selling agents.

—*Pennsylvania, Hawley. Henry Nollan, formerly of the United States Knitting Mills, has erected a temporary building on his farm until a new and larger building for his plant is completed. This is due owing to his inability to renew lease of the mill which he formerly operated, and which is now run by the United States Knitting Co., in which G. F. Simmons is interested.

—*Pennsylvania, Reading. Noide, Horst & Co.'s new knitting mill at this place is nearly ready for the machinery.

—*Pennsylvania, South Bethlehem. Plans have been completed for a new 2 story brick mill, 50x86 feet, for C. & J. Gould, who recently removed their knitting plant to Philadelphia and Hollidaysburg.

—Pennsylvania, York. Joseph Black & Sons, Tioga St. and Trenton Ave., Philadelphia, have leased space in the Penn Wall Paper Co.'s plant, and will establish a knitting mill here, for manufacturing fine hosiery. They will give employment to about 350 hands.

—*South Carolina, Orangeburg. The Orangeburg Knitting Mills, incorporated with capital of $10,000; B. H. Moss, president; J. T. Weeks, treasurer and superintendent, have purchased the Orangeburg Canning Factory and will start about May 15th, manufacturing hosiery. This plant was formerly located at Bamberg, S. C.

—*Vermont, Brattleboro. It is expected that the hosiery mill, now being established at this place by J. A. and Gen. H. B. Titus, will be put in operation in about a week. Employment will be given to about 20 people.

Enlargements and Improvements.

—Connecticut, Winsted. Contract for the additions and alterations to be made by the Winsted Hosiery Co. has been let to The Hotchkiss Bros. Co.

—Georgia, Athens. The Athens Knitting Mills are now erecting an addition, in which new machinery will be installed.

—*Massachusetts, Methuen. The Knitted Fabrics Company are building an addition to the new dye house recently erected.

—New York, Troy. A three story brick addition will be built to the Troy Knitting Co.'s Mill at Albia, N. Y. The building will be 60x90 feet and will be used as a storehouse.

—*North Carolina, Henderson. The Seaboard Knitting Mills, recently located at this place, will install a dyeing plant for dyeing knit cotton cloth in the roll.

—*Pennsylvania, Pottstown. The Park Hosiery Company, which we recently reported to establish a dye house in connection with the plant, will now make additional enlargements.

—Pennsylvania, Schuylkill Haven. Work has been started on an addition to the underwear mill operated by A. Lautenbacher.

—Wisconsin, Kenosha. A printing plant will be installed in the Chicago-Rockford Hosiery Co.'s works.

Mills Starting Up.

—*Connecticut, New Haven. The Glendora Knitting Co., whose plant was recently destroyed by fire, has leased new premises and will resume operations about May 1st. The capacity will be about 200 dozen half hose per day.

—Pennsylvania, Shoemakersville. The building formerly occupied by Geo. H. Grebe & Co., who recently removed to Reading, will now be utilized by Aaron Wagner, formerly in business at Reading and Jeremiah W. Heckman, of this place as a knitting plant. The machinery has been removed here from Mr. Wagner's Reading plant.

—Virginia, Lynchburg. The Virginia Textile Company have their new plant in full operation.

Mills Shutting Down.

—Pennsylvania, York. The Olympia Knitting Mills, which started up about six months ago, are retiring from business. All accounts are paid in full. They are going out of business because they find that a small plant making 50 dozen per day cannot successfully compete.

Silk.

New Mills.

—*New Jersey, Haledon. The Haledon Silk Mill, recently reported purchased by David Weil, of Brooklyn, has been leased by Simon Smith, who will manufacture silk goods, Mr. Weil being the selling agent. About 150 new looms will be installed and it is expected to have the plant in operation in a few weeks.

—New York, College Point. Schwarz & Levy have leased the silk mill formerly operated by Jacob Naeff. They will manufacture silk ribbons.

—Pennsylvania, Coplay. E. J. Lipps, president of the Lehigh Valley Silk Mill at So. Bethlehem and Capt. A. W. Leh, also of So. Bethlehem are interested in erection of large two story brick silk mill, 150x210 feet to be built here.

—*Pennsylvania, Kutztown. Work is now being pushed on the building of the Kutztown Silk Throwing Mills in order to put the plant in operation in about a week. It was expected to have the plant in operation last December, but owing to unavoidable delays were unable to do so.

—Pennsylvania, Philadelphia. A new dye house, 120 by 85 feet, 2 stories, will be built at Estaugh & J Sts. for L. B. Luithen.

—Pennsylvania, Tamaqua. It is reported that a silk mill, giving employment to about 150 people, will be established here by E. F. Stemmel and E. L. Storm, of Lehighton.

—Pennsylvania, Whitehaven. Frank Frigerio, formerly superintendent of the Freeland Silk Mill Co., and Peter Magagna, have formed a partnership known as the White Haven Silk Co., and will operate a mill at this place.

Enlargements and Improvements.

—Connecticut, So. Manchester. Preparations are now being made for an addition to be made to Cheney Bros. spun silk mill.

—*Connecticut, Stonington. A special meeting will be held by the stockholders of the American Velvet Co., to decide upon a further addition, of 60x80 feet to the present building. The estimated cost of the enlargement is about $10,000.

—*Pennsylvania, Emaus. Work will soon be started on an addition, 40 by 100 feet, 2 stories, to be built to the Keystone Silk Mill, Paul Gumbinner Co., proprietors. New looms will be installed.

—Pennsylvania, Philadelphia. The Century Tapestry Co. has purchased Wm. R. Crawford's mill on Fairhill St. Previously they have rented space in this plant, but owing to increase in business, needed more room.

—Pennsylvania, Shamokin. A new addition is now being erected to the Shamokin Silk Mill.

Mills Starting Up.

—*New Jersey, Paterson. The Laurel Silk Mill recently reported as shut down indefinitely, has resumed operations, the trouble with the weavers having been amicably settled.

—Pennsylvania, Bethlehem. Operations have commenced in the plant of the Bethlehem Silk Co., which recently leased the Allam Building, on Second Street.

Miscellaneous.

New Mills.

—Connecticut, Norwich. The United States Finishing Co. will erect a new building, 340 by 80 feet, 3 stories, at this place in connection with the plant now established.

—*New York, Fort Plain. The Alba Mfg. Co. has been incorporated with capital of $6000. J. H. Terwilliger, president; T. D. Ferguson, treasurer and C. O. Terwilliger, superintendent, for bleaching and dyeing cotton knit goods, cloth, yarns and waste.

—*North Carolina, Wilmington. The new dye works established at this place by H. M. Chase and associates will be known as the American Chemical and Textile Coloring Co. The plant has already been put in operation.

—Ohio, Columbus. A new dye works will be located at this place by Lewis Lang, who has recently had a new building erected for that purpose.

Enlargements and Improvements.

—Canada, Sherbrooke. A recent report states that the Dominion Brussels Carpet Co., will make extensive additions to the plant and will manufacture rugs and wilton carpets. It is also stated that a department for manufacturing tapestry, velvets and axminsters may be added.

—Connecticut, Sterling. Work has been started on erection of a new building, one story, for the Sterling Dyeing and Finishing Co.

—*Massachusetts, Chicopee Falls. Extensive improvements and additions are being made to the Hamden Bleachery. A new brick structure is now under construction, replacing some of the old buildings, recently torn down. New machinery will be installed later for bleaching and dyeing sheetings; the concern now only bleaching flannels.

—Massachusetts, No. Adams. The Windsor Print Works contemplate making various improvements and additions to the plant. They are now building an addition to be used as a dryer room, which will be double the size of the present one.

—Massachusetts, Webster. The Stevens Linen Works are now making additions and improvements to the plant and are building an addition, in which they will install additional cards.

—New Jersey, Gloucester City. Extensive alterations and repairs are being made to the Gloucester Print Works, during which time the plant will not be in operation.

—Pennsylvania, Philadelphia. An addition, 2 stories, giving them additional floor space of 10,000 feet on each floor will be erected by John T. Bailey & Co., to their plant, corner South Water and Tasker Sts. The first floor will be used as a balling and packing room for their rope and twine mill and the second for cutting department of the bag factory.

—Pennsylvania, Philadelphia. A three story brick drying building will be erected at John Nolan's dye works, 1716 Howard Street.

—Pennsylvania, Reading. A new building, 4 stories high, will be erected by the Prospect Dye Works.

Fires.

—Canada, Oshawa. The Schofield Woolen & Knitting Mills were damaged by fire to the extent of about $25,000. The central portion of the buildings containing the offices, tower and many expensive machines, was totally destroyed.

—Connecticut, New Haven. The Whiteknit Mills, LeRoy E. Whiting, proprietor, were completely destroyed by fire recently. The loss on building, stock and machinery is estimated at about $5,000.

—Connecticut, Putnam. The dye house occupied by John Knowlton, dyer of silk, formerly property of the Hammond Knowlton & Co., was destroyed by fire.

—Massachusetts, Collinsville. A fire occurred at the Collinsville Mill, of the American Woolen Co., April 18th. The building destroyed was used as a storehouse, scouring and picker rooms. It is reported that the loss, which is estimated at about $20,000 is covered by insurance.

—*Massachusetts, Lancaster. The Lancaster Shoddy Mill, recently started at this place by Byron E. Simpson, was totally destroyed by fire on March 30th. The plant will not be rebuilt.

—Pennsylvania, Danville. We have been informed that it was not the plant of the Danville Knitting Mills Co., which was reported destroyed by fire April 13th. It was the plant of W. J. Harrison, who was formerly connected with this mill, but who started in business for himself about three months ago, having leased rooms in some storage building.

—Rhode Island, Pawtucket. The stock house of the Charlton Mfg. Co. was destroyed by fire. The loss is estimated at about $1000, covered by insurance. The other buildings of this plant were totally destroyed by fire a short time ago.

Facts and Gossip.

—California, Alameda. It is reported that Hammond & Conger are interested in project which is now afoot for establishment of a $250,000 thread plant here. It is said the machinery has been purchased by those interested and that they are now only awaiting suitable location.

—Georgia, Atlanta. The Southern Cotton Mills & Commission Co. has been organized with a capital stock of $100,000, with the privilege of increasing to $1,000,000. This company is organized to furnish complete cotton mills for cities and towns wanting them. As we understand the project, they will advance part of the money and build mills, furnish complete equipment of machinery, and, if necessary, the personnel, and after the mill is running, handle the product. Among the incorporators are W. S. Witham of Atlanta, Ga., who has within the last few years become interested in a number of cotton mills; Benj. F. Strickland of Valdosta, Ga., and several Savannah gentlemen, among them being Henry D. Stevens, Thomas H. McMillan and John R. Young.

—Georgia, Hartwell. Another large cotton mill is proposed for this place. E. B. Benson, L. E. Meredith and A. N. Alford are interested in the project.

—Georgia, Lavonia. W. S. Witham, of Atlanta, Ga., is interested in organization of a company to establish a cotton mill at this place.

—Georgia, Montezuma. H. C. Black is interested in a cotton mill which is projected at this place.

—Georgia, Senoia. An effort is being made by B. A. Nolan and others to establish a cotton factory here, organizing a $100,000 company.

—Georgia, Siloam. A knitting mill is projected at this place by Edgar Boswell & Son.

—Illinois, Lanark. William Whitfield & Son have made a proposition to the citizens of Prosser, Wash., that if they grant him a bonus of $9000 in addition to a free site that he will locate his woolen plant at that place.

—Kentucky, Mayfield. The Mayfield Woolen Mills Co. has leased space in the new building at Fifteenth and Olive Street, St. Louis, Mo., and will remove their plant to that place.

—Massachusetts, Fall River. The stockholders of the Osborn Mills voted to increase the capital stock from $600,000 to $750,000.

—*Massachusetts, Lawrence. The Lawrence Dye Works have been incorporated under the name of the Lawrence Dye Works Company, C. G. V. Sjostrom, president, and I. L. Sjostrom, treasurer. This concern also has a branch plant at North Andover. They are building an addition.

—*Massachusetts, West Millbury. C. E. Hoyle is president and E. C. Ramseyer, treasurer, of the Ramshorn Mfg. Co., which has been incorporated with capital of $20,000 to operate the mill formerly operated by Edwin Hoyle and Son.

—Michigan, Grand Rapids. The Star Knitting Works have been incorporated with a capital stock of $60,000 by Austin, Emma and Samuel L. Walker and G. T. Kendall.

—New Jersey, Camden. The Joseph M. Adams Company has been incorporated with capital of $200,000. This is probably incorporation of plant operated by Joseph M. Adams, of Philadelphia.

—New Jersey, Haledon. The Haledon Silk Mill, formerly operated by Geo. H. Wicke, has been purchased by David Weil, of Brooklyn, who will manufacture broad goods required in his silk waist manufactory.

—*New York, Fredonia. The Standard Felt Company is now seeking a new location to re-establish their felt works. They ask that a building costing about $4000 be erected and presented to them.

—New York, Little Falls. Robert MacKinnon is now operating part of the Saxony Knitting Mill, manufacturing yarn, until the completion of his new plant.

—New York, Newport. Negotiations are now being made with Titus Sheard, of Little Falls, to organize a company to install machinery for manufacturing ladies' and children's underwear, in a new building which the town proposes erecting, 120 by 60 feet. A committee, in which D. P. Wooster, Millard Pierce and B. K. Brown are interested, has been appointed to raise the necessary amount.

—New York, St. Johnsville. The Royal Mills has been incorporated with capital of $25,000. J. H. Reaney, Otto W. Fox and G. C. Markell are the directors. They will operate the plant of the Royal Knitting Mills Co., of which J. H. Reaney was formerly proprietor.

—New York, Utica. The stockholders of the Utica Cotton Company recently held a meeting and decided to increase the capital stock from $100,000 to $250,000.

—New York, New York. The Dreesen Incorporated Company has been incorporated by Marie W. Dreesen and E. L. McBurney, with capital of $3000 for manufacturing cloth.

—*Pennsylvania, Altoona. Schwarzenbach, Huber & Co., whom we previously reported erecting a new mill, have now moved all the machinery in the old plant to the new one. The Board of Trade propose securing a tenant for the building vacated.

—Pennsylvania, Carlisle. The mill formerly occupied by the Pennsylvania Silk Co. of this place will be leased by a silk ribbon manufacturing concern, of Paterson, who will remove their entire plant here.

—Pennsylvania, Chester. The Standard Spinning Mills, which have been operated by the Arasapha Mfg. Co., will now be controlled by the Standard Spinning Company, with capital of $100,000. W. S. Blakeley is president; Edward E. Trainer, treasurer; and T. Woodward Trainer and Gardiner Richardson, managers. The new company expects to begin business about May 1st.

—Pennsylvania, Grove City. The Board of Trade and T. S. Bailey of Sandy Lake, with Charles Powers, of Mannington, W. Va., are interested in the company which will locate a woolen mill at this place, to give employment to about 50 people.

—Pennsylvania, Lebanon. C. W. Barlow, representative, and Emil J. Stehli, one of the proprietors of Stehli & Co., Swiss manufacturers, with headquarters at New York, have been at this place looking at locations suitable for a mill. They have made a report to the Board of Trade that they are satisfied with this place, and will recommend this place to the firm for location of a large mill.

—Pennsylvania, New Holland. The court has appointed Frederick L. Searing receiver of the New Holland Silk Co., whose liabilities are placed at about $30,000.

—Pennsylvania, Philadelphia. W. F. Hagar, Jr., has leased the Cope Mills, at Wayne Junction, and will manufacture cotton and worsted dress goods. F. C. Walton is also interested in the enterprise. The Philadelphia office is in the Bank Building, 421 Chestnut street.

—Pennsylvania, Philadelphia. The Imperial Woolen Company has recently been organized with James Dobson, president, and Dobson Schofield, secretary and treasurer, to operate the mills formerly controlled by Seville Schofield, Son & Co. in Manayunk. Men's wear, woolen and worsted goods and worsted yarns will be manufactured.

—Pennsylvania, Reynoldsville. The Reynoldsville Woolen Company has been reorganized, with S. B. Elliott, president; Dr. S. Reynolds, vice-president; Frank Beck, secretary, and Mr. Huyck, foreman. They will have capital stock of $50,000.

—Pennsylvania, Williamsport. A committee comprising Captain Sweeley, W. D. Crooks and Augustus Deiner has been appointed to secure location for a knitting plant to be established here by an outside party.

—Rhode Island, Allenton. The Belleville Mfg. Co. has been incorporated at Providence by J. P. Campbell, J. W. Campbell and J. R. Wilson, with capital of $150,000.

—*Rhode Island, Greenville. The Winsor Spinning Co., of which Wanton Vaughan is treasurer, is now manufacturing cotton yarns, Nos. 24 to 45. Most of the old machinery in the plant has been replaced with new.

—Rhode Island, Pawtucket. Frank A. Sayles of this place has purchased Frederic C. Sayles, new bleachery at Phillipsdale, which is under construction.

—*Rhode Island, Westerly. The Walker Woolen Mill, which was formerly leased by Campbell, Henault & Co., has been purchased at an auction sale by H. R. & William Segar.

—*South Carolina, Gaffney. The Limestone Mfg. Co., has recently placed orders for the machinery to be installed in the new plant. The equipment will consist of 10,000 spindles, 2500 twisters, 300 looms and other necessary machinery for manufacturing yarns and cloth. We have reported officers, etc., in a previous issue.

PERSONAL RECORD.

Cotton.

—Walter H. Armstrong, overseer of spinning in the No. 2 mill of the Whittenton Mfg. Co., Taunton, Mass., has resigned to accept a position in Holyoke, Mass.

—L. W. Buck, of Asheville, N. C., has removed to Spray, N. C., to assume charge as general manager of the several mills in that vicinity.

—E. Burnham, Lawrence, Mass., has accepted the position of boss carder at the Jackson Mill, Nashua, N. H., succeeding C. W. Cook.

—Alfred H. Burnham has been promoted from assistant superintendent of the Glasgow Mills, Philadelphia, Pa., to the position of manager.

—J. W. Chapman, superintendent of the Chace Mill at Moodus, Conn., has resigned.

—F. E. Crocker, boss carder at the Clinton Mill, Norwich, Conn., has resigned.

—J. A. Cook, overseer of the mule spinning in the Nourse Mill of the Social Mfg. Co., Woonsocket, R. I., resigned recently to accept a similar position at the Continental Mills, Lewiston, Me.

—C. W. Cook, overseer of the carding room of the Jackson Mfg. Co., Nashua, N. H., has resigned.

—Levi P. Cole, formerly at the Androscoggin Mill, Lewiston, Me., has accepted a position as overseer of weaving with the Lonsdale Co., Lonsdale, R. I.

—Benjamin Chace, Jr., late overseer of carding in the Knight Mills, Hebronville, Mass., is now with the New Hampshire Spinning Mills, Penacook, N. H.

—Luther Chance is now overseer of carding and spinning at the Victoria Cotton Mills, Rock Hill, S. C.

—D. Clark has resigned as boss carder at the Beaver Mill, North Adams, Mass., and H. B. Taylor has been promoted to fill the vacancy.

—John A. Fernley, overseer of the weaving department of the Williamstown Mfg. Co., Williamstown, Mass., has resigned.

—J. L. Gassett has assumed charge as superintendent of the Fort Mill, S. C., mill, succeeding James Gilligan. Mr. Gassett some years ago held a similar position with the Pelzer Co.

—William Gill, formerly employed by the American Yarn Mfg. Co., Pawtucket, R. I., has been engaged as overseer of the cloth room of the United States Cotton Co., Central Falls, R. I.

—William Greenlee, formerly of Knoxville, Tenn., has accepted charge of the cotton department of the Atlanta Woolen Mills Co., at Atlanta, Ga., which contains 5,000 spindles.

—Edward Hacking has been appointed overseer of the weaving department of the Border City Mills, Fall River, Mass., succeeding James Lee.

—Charles Edward Hall has recently severed his connection with the Fisherville Mfg. Co., Fisherville, Mass. He had been in the employ of the company for almost 20 years.

—William Howard, who has been overseer at night in the mule room at the Nourse Mill of the Social Mfg. Co., Woonsocket, R. I., has changed to overseer of that room on the day force.

—George A. Hurd is the new superintendent at the Cocheco Mills, Dover, N. H., taking the place of the late John Browne.

—A. Judge, of Manchester, Conn., is boss carder at the mill of the White Rock Mfg. Co., White Rock, R. I., having succeeded B. Button.

—James Lord is the new overseer of weaving at the Nantucket Mill, Spray, N. C.

—John M. Lawless, formerly of Woonsocket, R. I., has accepted charge of the mules at Chattanooga, Tenn.

—Fred Lacey has been appointed manager of the Valleyfield Cotton Mills, Valleyfield, P. Q., and has already entered upon his new duties. Mr. Lacey has been connected with the mills for a number of years.

—A. MacWhinnie, son of Superintendent MacWhinnie, of the Hebron Mills, Hebronville, Mass., has been appointed overseer in the carding room at the mills, succeeding B. C. Chace.

—G. W. Miles, for the past two and a half years assistant superintendent at the Bennett Mill, Fall River, Mass., has been appointed superintendent of the Globe Yarn Mills, Fall River, Mass.

—Hugh Maquire, formerly an overseer at the Lowell (Mass.) Bleachery & Dye Works, and later with the Canton (Mass.) Mfg. & Bleaching Co., has resigned to engage in business in Lowell.

—Patrick McKenna, overseer of carding at the Shove Mills, Fall River, Mass., has resigned.

—John W. Mitchell, who has been with the Leaksville Cotton Mills, Spray, N. C., for the past four years, the last two being employed as boss weaver, has been obliged to resign temporarily on account of his health. He expects, however, that it will not be long before he can resume operations again.

—Thomas Norwood has been elected president of the People's Cotton Factory, Montgomery, Ala., succeeding the late Capt. Jacob Greil.

—J. L. Odell has been promoted to the position of overseer of spinning and weaving at the Southern Cotton Mills, Bessemer City, N. C.

—Oscar G. Owen, superintendent of the John Rhodes Warp Co., Millbury, Mass., has retired after many years of service. He intends living in Whitinsville.

—James H. Robertson, overseer of the finishing department at the Slater Mills, Slatersville, R. I., has resigned to accept a similar position in West Warren, Mass., where he has removed with his family.

—Benjamin E. Ropp, overseer of the spinning department at the Lyman Mills, Holyoke, Mass., has resigned, and has gone to his home in Brooklyn, N. Y.

—A. Spence is slasher tender for the Hope Co., Hope, R. I., in place of his father, David Spence, who has just resigned after over 50 years of service.

—Thomas Smith, formerly assistant overseer of weaving in the No. 4 mill of the Pelzer Mfg. Co., Pelzer, S. C., has assumed the duties of overseer of weaving in mills Nos. 1 and 2 of that company.

—Henry T. Spencer, for over seventeen years overseer of carding in the Pepperell Mill No. 2, Biddeford, Me., has tendered his resignation.

—James E. Sloane, assistant overseer in the weaving department of the No. 4 mill of the Lonsdale Co., Lonsdale, R. I., has severed his connection with that concern.

—H. B. Taylor has succeeded D. Clark as boss carder at the Beaver Mill, North Adams, Mass.

—D. Zirpoli, boss carder at the Falls Co., Norwich, Conn., has severed his connection with that concern.

Woolen.

—Albion Allen has resigned his position at the Faulkner Mills, Lowell, Mass., to take charge of a large dye house in Providence, R. I.

—John Burdock has resigned as boss carder for E. Kenyon & Sons, Kenyon, R. I., and Charles Bromley has taken his place.

—Benjamin Brown, superintendent of the Charles A. Stevens Woolen Mills, Ware, Mass., has severed his connection with that company, after 22 years of service.

—John S. Clancy has secured the position of overseer of finishing with the Kiamensi Woolen Co., Stanton, Del.

—George Derham, assistant superintendent and designer for the Dingley Mfg. Co., Philadelphia, Pa., for the past two and a half years, has been promoted to the position of superintendent and designer.

—George E. Duffy has resigned as superintendent of one of the M. T. Stevens & Son's mills, North Andover, Mass., to accept a position as agent for the Charles River Mills, Franklin and North Bellingham, Mass.

—Joseph Dolan, recently boss finisher at the Sayles & Gilleran Worsted Mill, Woonsocket, R. I., has accepted a similar position at the Lakeside Worsted Mills at East Madison, Me.

—E. B. Flannagan, of Dracut, Mass., recently secured the position of boss finisher at the Ray Mills, Franklin, Mass.

—William House, recently carder at the Whitney Mills, Otter River, Mass., is now boss carder at the River Mills, Otter River.

—George Niven has been succeeded as boss dyer of the F. Scott & Son Mills, Saugus, Mass., by Eleazer Davis, formerly of the Puritan Mills, Plymouth, Mass.

—F. Hanlin, assistant finisher for the Assabet Mills, Maynard, Mass., has resigned, after four and a half years' service.

—J. T. Hepworth, superintendent of the Amsterdam Woolen Co., Amsterdam, N. Y., has tendered his resignation to the company.

—George Howarth has resigned as general agent for George Campbell & Co., Philadelphia, Pa.

—Thomas Hart, Tilton, N. H., has removed to Dover, N. H., where he is filling the position of section hand in the Sawyer Woolen Mill.

—Herbert A. Landall has been engaged as weaver and designer for E. K. Bready, Philadelphia, Pa.

—J. S. Muir has resigned as superintendent of the Beckman & Co.'s blanket mill, Cleveland, O., and returned to Philadelphia.

—James McNally, formerly employed by the Peace Dale Mfg. Co., Peace Dale, R. I., for 15 years, is now night overseer of carding, gilling and combing for the Centredale Worsted Co., of Centredale, R. I.

—Bentley Muff has resigned as overseer of carding and combing with James Doak, Jr., & Co., Philadelphia, Pa.

—J. Mack, Centreville, R. I., is now boss weaver at the Mapleville Mills, Mapleville, R. I.

—John McCrath, formerly with the Merion Worsted Mills, West Conshohocken, Pa., has been appointed superintendent for George Campbell & Co., Philadelphia.

—P. McColley, overseer at the Cowan Woolen Mill, Lewiston, Me., recently resigned.

—William N. R. McDougall has left James Irving & Son's mill at Chester, Pa., after eight years' service there, and has gone to Napa, Cal., to accept the position of agent and superintendent of the Napa Woolen Mills. Mr. McDougall met with much success at James Irving & Son's mill in the capacity of designer and assistant superintendent, but goes to California on account of his health.

—T. N. Parent of Allenton, R. I., has accepted the position of carder and spinner at the J. D. Clark Co.'s mill, Rochdale, Mass.

—L. A. Peckham has resigned as superintendent of the American Woolen Co.'s mill in Oswego, N. Y., and will locate permanently in Providence, R. I., where he has large interests in mill property.

—Samuel Perkins is now boss carder at the George Whitney Mills, Otter River, Mass. He was formerly of the A. L. Taft Mills, Union, N. H.

—Cornelius Rhoades, boss dyer for the past six years with the Oella (Md.) Woolen Mills, has resigned.

—Thomas Sexton has entered upon his new duties as night overseer of carding at the Saranac Worsted Mill, Blackstone, Mass.

—Alden B. Taplin, who recently finished a course at the Lowell Textile School, is now overseer of the weaving department at the Lippitt Woolen Mill, Woonsocket, R. I.

—A. B. Widdoes, formerly designer at the mill of the Westerly Woolen Co., Westerly, R. I., has removed to Amsterdam, N. Y., to become the superintendent of the Amsterdam Woolen Mills.

—William H. Wood, carder and comber for Herost & Jones, has accepted a similar position with James Lees & Sons, Bridgeport, Pa.

—John Wheeler has resigned as boss carder of George McFarland Co.'s mill in Gulf Mills, Pa.

—John Wetstone, overseer of the twisting room at the Lorraine Mills, Pawtucket, R. I., has finished his duties there. Upon taking leave, the employes under his charge as well as from other departments of the mills, presented him with a gold watch, chain and charm.

—J. H. Williams, formerly of the Camden Woolen Co., Camden, Me., is now designer for the Vassalboro Woolen Co., North Vassalboro, Me.

Knit.

—William H. Beaumont, formerly machinist in the finishing room of the Titus Sheard Co.'s mill, Little Falls, N. Y., has succeeded James H. Terwilliger as boss finisher. Mr. Terwilliger has gone to Fort Plain, where he will be interested in the management of the Alba bleaching and dyeing plant.

—A. W. Chapman, formerly manager of Lambert's Point Knitting Mill Co., Lambert's Point, Va., has accepted charge of the Williamsburg Knitting Mill Co.'s mill, at Williamsburg, Va., and will begin work the 1st of July.

—Alfred Carmen, formerly boss dyer at the Kane Mill, Averill Park, N. Y., has secured the position of dyer at the Troy Knitting Co.'s mill, Troy, N. Y.

—C. J. Copson, formerly with the New York Mills, New York Mills, N. Y., has accepted the position of overseer of mule spinning with the Perry Knitting Co., Perry, N. Y.

—James M. Court of Ypsilanti, Mich., has accepted the position of boss knitter with the Lakeside Knitting Co., Michigan City, Ind.

—Henry Garant, Franklin Falls, N. H., started in as superintendent at Mathis & Davis Co.'s new knitting mill in East Chattanooga, Tenn., May 1st.

—D. C. Gardner of Davisville, Mass., has accepted the position of boss carder at the Ipswich Mills, Ipswich, Mass.

—William H. Hart is now superintendent of the Lake Superior Knitting Works, Appleton, Wis.

—John A. Hartzell, superintendent of the plant of the American Hosiery Co., New Britain, Conn., died suddenly at his home in that place recently. He was 64 years of age.

—E. A. Lasner, who for some time past has been connected with the New England Knitting Co. of Winsted, Conn., has tendered his resignation to accept a position with the James Smith Woolen Machinery Co. of Philadelphia, as traveling salesman for the New England States.

—James B. Meacham has been appointed foreman of the Lasher Stocking Co.'s mill in Bennington, Vt.

—Nelson Rogers has been appointed superintendent of the Union Knitting Co., St. Johnsville, N. Y.

Deaths.

—Howland Croft, one of the leading citizens of New Jersey, the senior member of the firm of Howland Croft, Sons & Co., of Camden, N. J., worsted yarn manufacturers, and also owner of the Springfield Worsted Mills at Bordentown, died at his home April 28, after an illness of several months. He was born in Yorkshire, Eng., in 1839. His first work was in a worsted mill in his native town. From there he went to Farsley, in Yorkshire, and through successive stages reached the position of manager, which he held until 1867, when, through Mr. Briggs Priestly, father of his later partner, he was induced to go to America. He located in Philadelphia, becoming superintendent in the worsted mills of John & William Yewdall, the first of its kind in Philadelphia. Two years later, he took the superintendency of George Campbell's new worsted mill, remaining in that position until 1879, when he embarked on his own account, establishing the business of Croft, Midgely & Rommel, in Camden, which was the first worsted mill in New Jersey. In 1884 Mr. Croft bought out the other partners and took Herbert Priestly as an associate, and later the present well-known firm of Howland Croft, Sons & Co. succeeded them. The business has grown to very large proportions, at the present time employing about 1000 operatives. Mr. Croft was a very broad gauged business man. Besides having a thorough knowledge of his own business, he took a lively interest in municipal affairs, and was at the time of his death a member of the Sinking Fund Commission. He was a liberal giver to charitable work, and in his death the city of Camden loses one of its most public-spirited and esteemed citizens. For the past few years he had given less attention to business than formerly, owing to failing health, and his three sons, who survive him, will continue to conduct the business, as in the past. His widow and three daughters also survive him. The funeral was attended by a large number of prominent men, not only from Camden and Philadelphia, but many from New England and other sections where he had large business interests.

—Henry P. Holden, 58, died at his home in Palmer, Mass., at midnight, Thursday, April 12th. He was senior member of the firm of Holden & Fuller, woolen manufacturers, and had been prominently connected with many other large business enterprises. As one of the leading business men of Palmer, his loss will be seriously felt, and as a friend and associate he will be sincerely mourned.

—Albert Tilt, president of the Silk Association of America and of the Phoenix Silk Mfg. Co., Paterson, died after a long illness at his home in New York, May 2. In our April issue we published a biographical sketch and portrait of Mr. Tilt, and it is with much regret that we so soon chronicle his death in the prime of life.

—Allan Cameron of the Abbott Worsted Co. at Westford, Mass., died recently at the age of 77 years. He had been connected with the Abbott Co. since 1858. He was actively connected with the business up to the time of his death, and will be missed by a large circle of friends and many business associates in the worsted trade.

—Henry C. Thatcher, an old-time Boston merchant and head of the house of H. C. Thatcher & Co., wool merchants, died suddenly April 29. In early life he was engaged in Mediterranean foreign trade, and later engaged in the cotton business, which, however, about 15 years ago he gave up and confined his dealings to wool. He was born in Yarmouth, Mass., in 1829, and had always maintained a very close connection with Cape Cod affairs. Since 1896 Mr. Thatcher had not given much personal attention to his wool business, which has been carried on by his partners.

—Billings Mann, a well-known satinet manufacturer, died at his home in Worcester, April 22d, after an illness of nine days, of pneumonia. Mr. Mann was born in Leicester in 1842 and had resided in that town with the exception of the last 10 months. In 1879 George and Billings Mann, sons of Billings Mann, Sr., and John P. Stevens, a son-in-law, began business at Manville, at the plant which had been bought by Mann & Marshall in 1853. The mill was enlarged to make it one of the most important industries in Leicester. After the city of Worcester seized Kettle brook for the enlargement of its water system, Mann & Stevens went to East Brookfield, and started a mill, which is now in operation. Mr. Mann never took an active part in politics, devoting his time closely to business. He leaves a widow and four children.

—Wells Valentine, president and superintendent of the Valentine Knitting Co., Bennington, Vt., died at the residence of his father, April 4. He had been in poor health for several years and traveled extensively in foreign countries in the hope of getting relief, but although improved for a time, he at length failed rapidly, reaching home only a few days previous to his death. Mr. Valentine studied at Andover with the expectation of entering Yale College, but his health failing, was obliged to abandon study. He then began the knitting business and at 21 was the president of the Bennington Knitting Co., which, under his management, was very successful. A few years ago he retired from that company and entered the Valentine Knitting Co., soon after being made its president. His wife and one child survive him.

—Joseph W. Gould died of heart disease at his home in Gouldsville, Vt., April 14, at the age of 64 years. He was the owner of the woolen mill at Gouldsville, which has been in operation at that place since 1857, when it was purchased by his father, the late Joseph Gould, who died in 1876. Joseph W. Gould was in partnership with his father for twelve years previous to his death, and since that time has had the whole responsibility of the large concern. The mill is the principal industry of Gouldsville and his death will be keenly felt by the people of that place.

—William Schofield, a manufacturer of textile machinery, Philadelphia, Pa., died April 12th. Mr. Schofield came to this country from England, in 1848. He learned the trade of millwright and machinist in Manayunk, and early in the sixties began the manufacture of textile machinery, in 1872 erecting the first building of the present large plant. He leaves four daughters.

—James Moir, aged 80 years, one of the foremost woolen manufacturers of the country, died at his home in West Conshohocken, Pa., at midnight, April 14. At the time of his death he was president of the Conshohocken Woolen Co., and interested as an investor in many other enterprises.

—William Nuttall, a prominent knit goods manufacturer of Cohoes, N. Y., aged 75 years, died April 13. He was head of the firm of William Nuttall & Co., proprietors of the Halcyon Mills. Mr. Nuttall was born in Lancashire, Eng., January 18, 1826, and came to America in 1838 with his parents. In 1894 he bought the old Ranken Mill and started that factory, calling it the Halcyon Mill, and remained in the knit goods business until his death.

—Joseph Taylor, until about a year ago senior member of the firm of Joseph Taylor & Son, carpet manufacturers of Philadelphia, Pa., died at his residence last month, in his 84th year. He was born in Ireland, in 1816, and came to this country in 1848, locating in Philadelphia. For some time he conducted a grocery business, and about thirty years ago began the manufacture of carpets, which he continued until his retirement from business.

—John T. Little, a woolen importer, died at his home in New York City April 5. For many years he was connected with the firm of Arnold, Constable & Co., later became a member of the firm of Norris, Leonard & Pigot, and about five years ago engaged in business for himself as an importer of woolens.

—George Motley died at his residence in Lowell, Mass., April 12, at the advanced age of 91 years. He was superintendent of the Appleton Mills for 36 years, resigning in 1867 to become treasurer of the company, and served as treasurer until 1874, when he retired from active life. He was also interested in several of the other large corporations of the city, and had attained some prominence as a writer. He is survived by one son, George S. Motley, who is prominently identified with several manufacturing corporations and banks.

—Isadore Frankel, a prominent citizen of Detroit, Mich., died April 1st at Grace Hospital, at the age of 81 years. Mr. Frankel was born in Prussia, and came to this country along in the forties. He engaged in the manufacture of knit goods, and built up a factory in this city, which he operated successfully for a number of years. He retired from active business some time ago.

—Stephen W. Pierce, who was foreman for the Warren Thread Co. for a number of years, retiring November, 1897, on account of failing health, died last month at his home in Ashland, Mass. Mr. Pierce was a civil war veteran, having served as a musician in company K, 52d Massachusetts regiment.

—W. C. Sanders, head of the firm of Sanders, Swann & Co., Atlanta, Ga., one of the prominent cotton firms in the United States, died suddenly March 29th in Florida, where he had gone for his health. Mr. Sanders had been in the cotton business since the close of the civil war, and was considered one of the foremost men in the business. For a number of years he was manager of the firm of S. M. Inman & Co.

—Capt. Reuben Grove Clark, a highly esteemed citizen of Rome, Ga., died suddenly March 2. Capt. Clark was born in Grainger Co., Tenn., Nov. 10, 1833. He engaged in the wholesale dry goods business in Rome, and for some years after closing out his wholesale interests, was in private banking business, and on the death of Mr. T. F. Howel several years ago, was chosen executive head of the Howel Cotton Co., which position he occupied at the time of his death.

—John Kenworthy, an expert cloth finisher, died suddenly at his home in Manayunk, Philadelphia, Pa., April 8. He had filled the position of boss finisher in a number of the largest mills at Manayunk.

—Joseph Watmouth, a retired worsted manufacturer, died at his home in Hudson, Mass., April 2, after about a year's illness.

—John Gibson, overseer of the winding room in the Nemasket Mills, East Taunton, Mass., died April 23d, after a short illness of pneumonia.

—Henry Menger, a silk manufacturer of Paterson, N. J., died April 20th. He was 43 years old. A widow and two children survive him.

Artificial Cotton.

The Forezien gives the following interesting information regarding this new product. To obtain the pure cellulose necessary for artificial cotton, the wood of the fir tree is used; the knots and bark are removed and the limbs are run through a machine which cuts them up into small pieces; 100 cubic metres of the wood thus cut up are placed in a horizontal copper cylinder about 39 feet long and 13 feet in diameter and lined with lead. The steam is turned on and the wood steamed for ten hours; then 60 cubic metres of bisulphite of soda are introduced and a steam pressure of 45 lbs. is introduced for about 36 hours.

The wood, which is now white, is washed and submitted to a pounding by power hammers. After that, the wood is bleached still more by chloride of lime or an electro-chemical process, then squeezed between two heavy rollers to dry it; this is pure cellulose which is mixed with chloride of zinc, chlorohydric and acetic acid and heated in a tank. A small quantity of castor oil, caseine, or gelatine, is added to give the fibre cohesion. This pasty mass is placed in a chamber where it is subjected to pressure and forced into a fibre or thread; the thread is then run through a weak solution of carbonate of soda and dried on steam cylinders. It is necessary to run the thread through a bath of ammonia to give it solidity and then through cold water. It is now ready to be worked and can be easily woven. It can be colored and will take a good lustre.

—A French patent has been taken out for improving upon the lustre produced by mercerization with stretching. The yarn is steamed after the action of the lye instead of subjecting it to powerful tension. The resulting yarn is said not only to have a lustre otherwise unattainable, but to dye much more level than ordinary mercerized goods. It would hardly seem probable, however, that this process will answer better than the very similar one previously patented in France by Vanoutryve.

Stamps for Cotton, Linen and Knit Goods.

This cut is a sample of the excellent work which Mr. A. M. Wildman, Albany, N. Y., turns out in the line of stamps for textile goods. He manufactures all kinds of rubber, brass and steel stamps for mill use and deals in stamp pads, ink, etc. This cut is made from one of his brass stamps for cotton manufacturers, and shows the fine work he does. He also makes a specialty of supplying the knitting trade and carries a full line of supplies in this line at reasonable prices.

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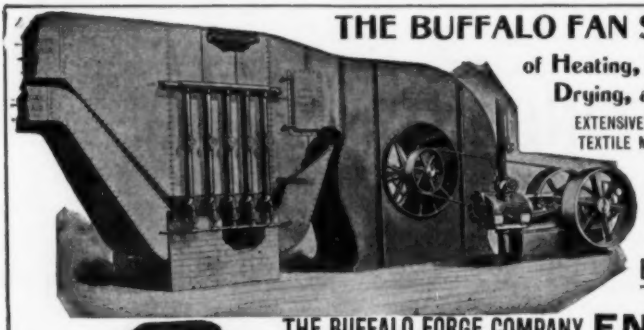

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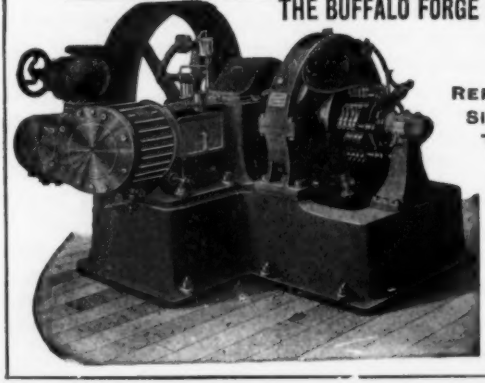

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BUYERS' INDEX.

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American Moistening Co., 150 Devonshire St., Boston.

Arc Lamps.
Lea Manufacturing Co., Elwood, Indiana.

Architects and Mill Engineers.
Berlin Iron Bridge Co The, East Berlin, Ct.
Ferguson, John W., Paterson, N. J.
Tower & Wallace, Broadway and 25th St., New York, N. Y.

Artificial Stone.
Warren Bros. Co., 143 Federal St., Boston.

Asphalting & Asphalt Materials.
Warren Bros. Co , 143 Federal St., Boston.

Asphalt Roofing.
Warren Bros. Co. 143 Federal St., Boston.

Automatic Feeds for Cotton and Wool.
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Jeffrey Manufacturing Co., Columbus, Ohio.
Link Belt Machinery Co., Chicago, Ill.
Popham, Henry, & Son, Newark, New Jersey.
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Brushes.
Felton, S. A. & Son Co., Manchester, N. H

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Brown, W. H, Mechanic St, Worcester Mass.

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Hirschman, H. 419 Broome St., New York.

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Conveying Machinery and Chains.
Jeffrey Manufacturing Co., Columbus, O.
Link Belt Machines Co., Chicago, Ill.

Copper (Perforated.)
See under Perforated Metal.

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New Bedford Copper Co, New Bedford Mass.
Phillips Co, The Thomas, Providence, R. I.

Copper Work for Dyers.
Butterworth, H. W. & Sons Co., Philadelphia.
Granger Foundry & Machine Co, Providence, R. I.
Phillips Co, The Thomas, Providence, R. I.

Corrugated Iron Shutters.
The Berlin Iron Bridge Co., East Berlin, Conn.

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Stoddard, Haserick, Richards & Co., Boston.

Cotton Elevators.
Buffalo Forge Co., Buffalo, N. Y.
Link Belt Machines Co., Chicago Ill.

Cotton Machinery.
Altemus, W. W. & Son, 2816 N. 4th St, Phila. Pa.
Ashworth, Elijah, Fall River, Mass.
Butterworth, H. W. & Sons Co., Philadelphia.
Curtis & Marble Machine Co, Worcester, Mass.
Draper Company, Hopedale, Mass.
Easton-Burnham Co., Pawtucket, R. I.
Fairmount Machine Co, 22d and Wood Sts, Philadelphia.
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Mason Machine Works, Taunton, Mass.
McKerrow, H. G & Co., Boston, Mass.
Philadelphia Drying Machinery Co., 6721 Germantown Ave., Philadelphia, Pa.
Philadelphia Textile Machinery Co, Hancock and Somerset Sts, Philadelphia, Pa.
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Schofield, Geo. L., Philadelphia.
Stoddard, Haserick, Richards & Co, Boston, Mass.
Whitin Machine Wks, Whitinsville, Mass.
Woonsocket Machine & Press Co, Woonsocket, R. I.

Cotton Openers and Lappers.
Howard & Bullough American Machine Co, Pawtucket, R. I.

Cutters for Knit Fabrics.
Kennedy, Thos. (Cutters, etc.,) Cohoes, N. Y

Decoration Wash for Interiors.
Moore, Benj. & Co., Brooklyn, N. Y.

Designers.
Freund, Eugene F., 140 Maiden Lane, New York.

Dextrine.
Stein, Hirsh & Co, 165 Duane St., New York.

Dryers.
Arlington Machine Works, Arlington Heights, Mass
Birch Brothers. Somerville, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Butterworth, H. W. & Sons Co., Philadelphia.
Granger Foundry & Machine Co., Providence, R. I.
Kenyon, D. R. & Son., Raritan, N. J.
Philadelphia Drying Machinery Co., 6721 Germantown Ave., Philadelphia.
Philadelphia Textile Machinery Co, Philadelphia, Pa.
Phillips Co, The Thomas, Providence, R. I.
Rusden Machine Co., Warren, R. I.
Sargent's, C. G., Sons, Graniteville, Mass.
Sturtevant, B. F. Co, 34 Oliver St, Boston, Mass.

Dusters.
See Wool and Waste Dusters.

Dyers, Bleachers and Finishers.
American Yarn Printing Works, 134-150 North 22d St., Philadelphia.
Brophy's, T, Sons, Jasper St, Philadelphia.
Capstick, John & Sons, Montville, N. J.
Cohoes Dye Works, Cohoes, N. Y.
Cranston Worsted Mills (yarns), Bristol R. I.
Davidson & Brooke, 2560 No. 3d St., Philadelphia.
Duncan & Baillie, Cohoes, N. Y.
Firth & Foster Co, Kensington, Pa.
Greenwood, R. & Bault, Frankford, Pa.
Home Bleach & Dye Works, Pawtucket and Valley Falls, R. I.
Littlewood, G. J., & Sons, Manayunk, Pa.
Lorimers, The Wm. H. & Sons Co., Phila.
Molt Bros., Millbury, Mass. (Indigo Blue.)
New England Thread Co, Pawtucket, R. I.
Pawtucket Dyeing & Bleaching Co, Pawtucket, R. I.
Philadelphia Linen Finishing Co., Frankfort, Philadelphia.
Rowland, Samuel, Schuylkill Haven, Pa.
Warren, W, Thread Works, Westfield, Mass.

Dyeing, Drying, Bleaching and Finishing Machinery.
Arlington Machine Works, Arlington Heights, Mass.
Birch Bros., Somerville, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Butterworth, H. W. & Sons Co Phila Pa.
Curtis & Marble Machine Co, Worcester, Mass.
Fairmount Machine Co, 22 and Wood Sts, Philadelphia.
Granger Foundry & Machine Co, Providence, R. I.
Hopkins, Machine Works, Bridgeton, R. I.
Howard, Geo. C., 1783 Barker St., Phila., Pa.
Kenyon, D. R. & Son, Raritan, N. J.
Knapp, C. H., Paterson, N. J.
Lincoln, The, Co, 54 Arch St, Hartford, Ct.
Parks & Woolson Machine Co., Springfield, Vt.
Peel, Samuel H. Germantown, Philadelphia Pa.
Phenix Iron Foundry, Providence, R. I.
Philadelphia Drying Machinery Co., 6721 Germantown Ave., Philadelphia, Pa.
Philadelphia Textile Machinery Co, Hancock and Somerset Sts, Philadelphia, Pa.
Phillips, The Thomas Co, 91-95 South Main St, Providence, R. I.
Rusden Machine Co., Warren, R. I.
Sturtevant, B. F. Co, 34 Oliver St, Boston, Mass. (Drying.)
Weihe, H. C. Philadelphia.
Woonsocket Machine & Press Co, Woonsocket, R. I.

Dye House Cans.
Hill, James Mfg. Co., Providence, R. I.

Dyehouse Floors.
Warren Bros., 143 Federal St., Boston.

Dye Sticks,
Bailey, Frank, Cedar Brook, New Jersey.
Haedrich, E. M., Philadelphia, Pa.

Dyestuffs and Chemicals.
American Aniline Co., 163 No. Front St., Philadelphia.
Anchor Color Mfg. Co, 464 Cherry St, New York.
Atteaux, F. E. & Co., 174-176 Purchase St Boston.
Berlin Aniline Works, 72 Front St., N. Y.
Bischoff, & Co, 87 Park Place, N. Y.
Bosson & Lane, 36 Central Wharf, Boston.
Corey, S. J, 273 Congress St, Boston.
Dillon & Co, 20 Cedar St, New York.
Farbenfabriken of Elberfeld Co, 40 Stone St, N. Y.
Geisenheimer & Co, 189 Front St, New York.
Innis & Co, 3 Cedar St, New York.
Jaeck Bros., The, Co., 62-68 No. 11th St, Brooklyn, N. Y.
Janney, O. S, & Co, Phila. and Boston.
Johnson, Chas. A, & Co, 22 Dey St, N. Y
Johnson, Wm. G, & Co, Uncasville, Conn.
Keller, John J, & Co, 104-106 Murray St, N. Y.
Klipstein, A, & Co, 122 Pearl St, N. Y.
Koechl, Victor, & Co, 122 Hudson St, N. Y.
Kuttroff, Pickhardt & Co., New York.
Matheson, W. J, & Co, 182-184 Front St, N.Y.
Merrimac Chemical Co, Boston, Mass.
Molt Bros., Millbury, Mass. (Indigo Blue.)
N. Y. & Boston Dyewood Co, 55 Beekman St, New York.
Oakes Mfg. Co, 93 Pearl St, N. Y.
Richmond & Foley, 235 N. Front St., Philadelphia.
Roessler & Hasslacher Chemical Co, 100 William St., New York.
Schoellkopf, Hartford & Hanna Co., Philadelphia.
Sharpless Dye Wood Ext. Co, The Bourse, Phila, Pa.

Stamford Mfg. Co, 133-137 Front St., N. Y.
Stone & Ware Co, The, 157 Maiden Lane, N. Y.
Sykes & Street, 85 Water St, N. Y.
Thayer, Ed. M., 106 Broad St., Boston, Mass.

Dynamos.
Sturtevant, Co., B. F. Boston.

Edgings.
See Tapes, Braids and Edgings.

Elastic Web Calendering Machines.
Knapp, C. H., Paterson, N. J.

Electrotyping and Printing.
Whitcomb, H. C, & Co, Boston.

Elevators.
Cohoes Foundry & Machine Co, Cohoes, N.Y.
Eastern Machinery Co, The, New Haven, Conn.
Jeffrey Manufacturing Co., Columbus, O.
Howard, Geo. C., 1783 Barker St., Phila., Pa.

Electrical Construction.
Philadelphia Electric Construction Co., Philadelphia.

Electric Fans.
Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Boston.

Electric Motors.
Sturtevant Co., B. F., Boston.

Engine Foundations.
Warren Bros. Co., 143 Federal St., Boston.

Engineers, Mechanical.
Berlin Iron Bridge Co., The, East Berlin, Conn.
Ferguson, John W, Paterson, N. J.
Rittenhouse, Frank, Norristown, Pa.

Exhaust Heads.
Burt Manufacturing Co , Akron, Ohio.

Fans—Exhaust and Ventilating.
See Ventilating Apparatus.

Feed Water Heaters.
Pendleton, Walter & Co., New York.

Feed Water Pumps.
Goulds Mfg. Co, Seneca Falls, N. Y.
Phœnix Iron Foundry, Providence, R. I.

Finishing Machinery.
See Dyeing, Drying, Bleaching and Finishing.

Fireproof Construction.
The Berlin Iron Bridge Co., East Berlin, Conn.

Fluted Rolls.
Cohoes Foundry & Machine Co, Cohoes, N.Y
Thurston, A. G, & Son, Box 528, Fall River Mass.

Forges.
Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Boston.

Friction Clutches.
See Clutches.

Friction Hoisting Drums.
Eastern Machinery Co., New Haven, Conn.

Fulling Mills for Woolen Goods.
Hopkins, Machine Works, Bridgeton, R. I.
Hunt, Rodney, Machine Co, Orange, Mass.
Hunter Jas, Machine Co, No. Adams, Mass.

Gas Engines.
Jones, Lewis, 60½ and Media Sts, Phila, Pa.

Gas Exhausters.
Sturtevant Co., B. F., Boston.

Gas Singeing Machines.
Birch Brothers, Somerville, Mass.
Butterworth, H. W. Sons Co., Philadelphia.
Curtis & Marble Machine Co, Worcester, Ms.
Granger Foundry & Machine Co., Providence, R. I.
Rusden Machine Co., Warren, R. I.

Gear Cutting Machine.
Whiton, The D. E, Co, New London, Conn.

Generating Sets.
Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F , Boston.

Heating.
See Ventilating.

Heddles.
Watson, L. S, Mfg. Co, Leicester, Mass.

Hoisting Machinery.
The Eastern Machinery Co., New Haven, Conn.

Hose.
Boston Belting Co., Boston.

Hosiery Boards.
Pearson, J. T, Kensington, Pa.

Humidifying Apparatus.
American Air Moistening Co., Boston.

Hydro Extractors.
American Tool & Machine Co , Boston.
Rusden Machine Co,. Warren, R. I.

Knit Goods Edgings, Trimmings, etc.
Cathcart, John & Co., 115 Franklin St., New York.
Cheney Bros, Silk Goods, 479 Broome St, N. Y.
Friedberger & Co, Edgings, Germantown Phila, Pa.
Fleming & Chapin, Philadelphia.
Hepner & Horwitz, Lacings, 30 Howard St, N. Y.
Kavanaugh, Geo. W., Cohoes, N. Y.
Krout & Fite Mfg. Co, Allegheny Ave. and Emerald St., Phila.
Weimar Bros, 1817 East York St, Phila Pa.

Knit Goods Finishing Machines, Crochet, Etc.
Merrow Machine Co, The, Hartford, Conn.
Nye & Tredick, 606 Arch St, Phila, Pa.
Scott & Williams, 2079 E. Cumberland St, Phila Pa.

Knitting Machine Cylinders.
Paxton & O'Neill, 129 Bread St, Phila, Pa.
Stafford & Holt, Little Falls, N. Y.

Knitting Machinery.
American Knitting Machine Co., 115 Wickenden St., Providence, R. I.
Beattie, Wm. & Son, Cohoes, N. Y.
Branson Machine Co., 506 John St., Philadelphia.
Campbell & Clute, Cohoes, N. Y.
Cooper, Chas, Bennington, Vt.
Crane Mfg. Co, Lakeport, N. H.
Excelsior Knitting Machine Manufacturing Co., Allentown, Pa.
Fisher Knitting Machine Co., Utica, N. Y.
Franklin Transfer Co., Franklin Falls, N. H.
Hepworth & Co, Lehigh Ave. and Mascher St, Phila, Pa.
Jenckes, E. Mfg. Co, Pawtucket, R. I.
Jones, Lewis, 60 1-2 and Media Sts, Philadelphia, Pa.
Kennedy, Thos. (Cutters, etc.), Cohoes, N. Y.
Leighton Machine Co, Manchester, N. H.
Lindley, Geo. W., 5122 Wakefield St., Germantown, Pa.
Mayo Knitting Machine & Needle Co, Franklin, N. H.
McMichael & Wildman Mfg. Co, Norristown, Pa.
Nye & Tredick, 606 Arch St, Phila, Pa.
Paxton & O'Neill, 127 Bread St, Phila, Pa.
Pepper Mfg. Co, Lakeport, N. H.
Scott & Williams, 2079 E. Cumberland St., Phila., Pa.
Snyder, Homer P. Mfg. Co. Little Falls, N. Y.
Stafford & Holt, Little Falls, N. Y.

Knitting Needles and Supplies.
Breedon, Wm, & Son, Amsterdam, N. Y.
Cooper, Chas, Bennington, Vt.
Corey, Wm, Co, Manchester, N. H.
Crane Mfg. Co , Lakeport, N. H.
Dodge Needle Co., Manchester, N. H.
Ives, Loyal T, New Brunswick, N. J.
Kavanaugh, Geo. W., Cohoes, N. Y.

Lydall, H, & Foulds, Manchester, Conn.
Manufacturers' Supplies Co., 66 No. 4th St. Philadelphia.
Mayo Knitting Machine & Needle Co, Franklin, N. H.
Page Needle Co, Chicopee Falls, Mass.
Treat, Orion, Manchester Green, Conn.
Wardwell Needle Co, Lakeport, N. H.

Laboratory Outfits.
Bullock & Crenshaw, 528 Arch St. Phila, Pa

Looms.
Crompton & Knowles Loom Works, Worcester, Mass.
Draper Company, Hopedale, Mass.
Fairmount Machine Works, 22d and Wood Sts, Philadelphia.
Furbush, M. A, & Son Co, Phila, Pa.
Howard, Geo. C., 1783 Barker St, Phila Pa. (For wire.)
Kilburn, Lincoln & Co, Fall River, Mass.
Leigh, Evan A., 35 Mason Bldg., Boston.
Lowell Machine Shop, Lowell, Mass.
Mason Machine Works, Taunton, Mass.
Whitin Machine Works, Whitinsville, Ms.
Woonsocket Machine & Press Co, Woonsocket, R. I.

Lubricators.
Ameledema Oilless Bearing Co., Berkeley St, Wayne Junction, Philadelphia.
Dixon, Jos., Crucible Co, Jersey City, N. J.

Lumber.
Stearns, A. T, Lumber Co, Neponset, Mass.

Lumpers.
Gerry, George, & Son, Athol, Mass.

Machinery Dealers.
Jefferson, Ed, & Bro, 28 Strawberry St, Phila, Pa.
Schofield, Geo. L. Phila., Pa.

Machinists' Tools.
Whiton, The D. E. Co, New London, Conn.

Mails.
Walder, J, Paterson, N. J.

Mechanical Draft.
Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Boston.

Measuring and Folding Machines.
Curtis & Marble Machine Co, Worcester, Ms.
Elliott & Hall, 54½ Hermon St, Worcester Mass.

Mercerizing Machinery.
Butterworth, H. W. & Sons, Philadelphia.
Granger Foundry & Machine Co., Providence, R. I.
Rusden Machine Co., Warren, R. I.

Mill Brushes.
See Brushes.

Mills For Sale.
Denny, R. B., 143 Federal St., Boston.

Mill Builders and Engineers.
Berlin Iron Bridge Co, The, East Berlin, Ct
Ferguson, John W, Paterson, N. J.

Mill Supplies.
American Supply Co, Providence, R. I.
Bamford & Smith, Pascoag, R. I.
Bristol, The, Co., Waterbury, Conn
Buckley's, Benj. Son, Gun Mill, Paterson, N. J.
Dixon Lubricating Saddle Co., Bristol, R.I.
Easton-Burnham Co., Pawtucket, R. I.
Holmesburg Banding Mfg. Co., Holmesburg, Pa.
Jefferson, Ed, & Bro, 28 Strawberry St, Phila, Pa.
Jeffrey Manufacturing Co., Columbus, O.
Thurston, A. G, & Son, Fall River, Mass.
Watson, L. S, Mfg. Co. Leicester, Mass.

Napping Machines.
American Napping Machine Co, Williamstown, Mass
Ardrey, S. B, & Sons, Bristol, Pa.
Curtis & Marble Machine Co, Worcester, Mass.
Jones, Lewis, 60 1-2 and Media Sts., Philadelphia, Pa.

Noils (Silk.)
Champlain Silk Mills, Whitehall, N. Y.
Ryle, Wm & Co., 54 Howard St., N. Y.
Malcolm Mills Co., Frankford, Pa.

Oil Filters.
Burt Manufacturing Co., Akron, Ohio.

Packing.
Boston Belting Co, Boston.
Jenkins Bros., New York.

Painting and Whitewashing Machine.
Triumph Machine & Manufacturing Co., 209 Hester St, New York, N. Y.

Pantagraphs for Mill Engraving.
Johnson, C. A, & Co, 22 Dey St, New York.

Patterns of European Novelties.
European Pattern Supply Co., 530 Broadway, N. Y.

Patent Solicitors.
Crosby & Gregory, 34 School St, Boston, Mass.
Siggers, E. G., Washington. D. C.
Wright, Brown & Quinby, 53 State St, Boston, Mass.

Pavers & Paving Materials.
Warren Bros. Co., 143 Federal St., Boston.

Perforated Metal.
Beckley, A. J. & Co., Garwood, N. J.
Fraser & Chalmer, Chicago, Ill.
Harrington & King Perforating Co., 230 North Union St, Chicago, Ill.

Peroxide of Sodium.
Roessler & Hasslacher Chemical Co., 100 William St, New York.

Picker Sticks.
Loom Picker Co., Biddeford, Me.

Picking, Carbonizing and Garnetting.
Garfield Woolen Co, Garfield, N. J.

Pipe Covering.
Keasby, R. A. 83 Warren St, New York.
Norristown Covering Co., Norristown, Pa.

Pneumatic Conveying.
See Ventilating.

Power Transmitting Machinery.
Ameledema Oilless Bearing Co, 149 West Berkley St, Wayne Junction, Pa.
Channon, H, Co, 25 Market St, Chicago, Ill.
Christiana Machine Co., Christiana, Pa.
Eastern Machinery Co, New Haven, Conn.
Fairmount Machine Works, 22d and Wood Sts, Philadelphia.
Howard, Geo. C., 1783 Barker St., Phila., Pa.
Hunter, Jas, Machine Co, No. Adams, Mass.
Jeffrey Manufacturing Co., Columbus, O.
Kilburn, Lincoln & Co Fall River, Mass.
Link Belt Machinery Co, Chicago, Ill.
Rusden Machine Co., Warren, R. I.
Saginaw Manufacturing Co., Saginaw, Mich.

Presses.
Boomer & Boschet Press Co., 338 West Water St., Syracuse, N. Y.
Butterworth, H. W. & Sons Co., Philadelphia
Crawford. J. J, & Son, Nashua, N. H. (Power Screw, Hydraulic, Hollow Steam Plate.)
Curtis & Marble Machine Co, Worcester, Ms.
Hart, Charles, Frankford, Philadelphia.
Howard, Geo. C., 1783 Barker St., Phila., Pa.
Phillips Co, The Thomas, Providence, R. I.
Woonsocket Machine & Press Co, Woonsocket, R. I.

Printers (Fabrics and Yarn.)
Capstick, John & Sons, Montville, N. J.
American Yarn Printing Works, Philadelphia.

Pulleys.
See Power Transmitting Machinery.

Pulley Covers.
Warren Mfg, Co., Chicago, Ill.

Pumps.
Goulds Mfg. Co, Seneca Falls, N. Y.
Rusden Machine Co., Warren, R. I.

Reed and Harness Manufacturers.
American Supply Co, Providence, R. I.
Walder, J, Paterson, N. J.

Ribbons.
Cheney Bros, S. Manchester, Ct.

Ring Travellers.
National Ring Traveller Co., Providence, R. I.
Morley Button Mfg. Co., Boston.

Roofing Asphalt.
Warren Bros. Co., 143 Federal St., Boston.

Roofing, Gravel, Slag and Composition.
Armitage Mfg. Co, Richmond, Va.
Eastern Granite Roofing Co., Jersey City N. J.

Roofing Materials (Manufacturers).
Warren Bros. Co., 143 Federal St., Boston.

Roofing, Paint and Paper.
Armitage Mfg. Co, Richmond, Va.
Warren Bros. Co., Boston, Mass.

Rope Transmission.
American Mfg. Co., New York.
Channon, H. Co., Chicago.
Holmesburg Banding Mfg. Co., Holmesburg, Pa.

Roving Cans.
Hill, James Mfg. Co., Providence, R. I.
N. E. Ventilating & Heating Co, 930 Manton Ave, Providence, R. I.
Laminar Fibre Co., No. Cambridge, Mass.
Walrus Fibre Mfg. Co., Medford, Mass.

Rubber Covered Rollers and Goods.
Boston Belting Co., Boston.

Saddles and Stirrups.
Dixon Lubricating Saddle Co., Bristol, R. I.

Schools.
American Correspondence School of Textile, New Bedford, Mass
Lowell Textile School, Lowell, Mass.
Philadelphia Textile School, Phila, Pa.

Screens (Perforated.)
See under Perforated Metal.

Sewing Machines and Supplies.
American Machine Co., 420 Library St., Phila.
Birch Bros., Somerville, Mass.
Curtis & Marble Machine Co, Worcester, Mass.
Excelsior Sewing Machine Co., Philadelphia.
Manufacturers' Supplies Co, 66 No. 4th St., Philadelphia.
Nye & Tredick, 606 Arch St, Phila, Pa.
Rusden Machine Co., Warren, R. I.
Standard Sewing Machine Co, Cleveland, Ohio.
Scott & Williams, 6th and Arch Sts, Phila, Pa.

Shearing Machinery.
See Dyeing, Drying, Bleaching and Finishing

Shell Rolls.
Cohoes Foundry & Mach. Co, Cohoes, N. Y.
Thurston, A. G, & Son, Box 528, Fall River Mass.

Shoddies.
See Wool Shoddies

Shuttles.
See Bobbins, Spools, Shuttles, Etc.

Silk Machinery.
Butterworth, H. W. Sons Co, Philadelphia.
Granger Foundry & Machine Co., Providence, R. I.
Knapp, C. H., Paterson, N. J.
Mason Machine Works, Taunton. Mass.
Rusden Machine Co., Warren, R. I.

Singe Plates.
Butterworth, H. W. Sons Co., Philadelphia.
New Bedford Copper Co, New Bedford, Mass

Sizing, Starch and Gums.
Stein, Hirsch & Co, 165 Duane St, New York.

Slashers.
Cohoes Foundry & Machine Co, Cohoes, N. Y.
Lowell Machine Shop, Lowell, Mass.
Phillips & Thomas, Providence, R. I.

Soaps.
India Alkali Works, Boston, Mass.

Spindles.
Bamford & Smith, Pascoag, R. I.
Buckley, Benj's, Sons, Gun Mill, Paterson, N. J.
Draper Company, Hopedale, Mass.
Easton-Burnham Co., Pawtucket, R. I.
Ward & Vandegrift, Elmer, N. J.
Whitin Machine Wks, Whitinsville, Mass

Spindle Tubes.
Bamford & Smith, Pascoag, R. I.

Spinning Cylinders.
N. E. Ventilating & Heating Co, 930 Manton Ave, Providence, R. I.

Spinning Frames.
See Cotton Machinery.

Spinning Frames for Wool
Woonsocket Machine and Press Co., Woonsocket, R. I.

Spinning Rings.
Draper Company, Hopedale, Mass
Morley Button Mfg. Co., Boston, Mass.
Whitinsville Spinning Ring Co, Whitinsville, Mass.

Spinning Tubes.
Buckley, Benj's. Son, Gun Mill, Paterson, N. J.

Spools. *See Bobbins, Spools Shuttles, Etc.*

Sprinklers.
International Sprinkler Co., Philadelphia, Pa.

Stamps and Checks.
Michael, A. M. Albany, N. Y.

Steam Boilers.
Brown, C. H, & Co, Fitchburg, Mass.
Lee-Odlum Co., Memphis, Tenn.
Pendleton, Walter & Co., New York.

Steam Boiler Compound.
Straus & Co., 55 Broad St., New York.

Steam Boiler Insurance.
Hartford Steam Boiler Inspection & Insurance Co, Hartford, Conn.

Steam Engines.
American Blower Co., Detroit, Mich.
Brown, C. H, & Co, Fitchburg, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Hooven (The), Owens & Rentschler Co Hamilton, O.
Pendleton, Walter & Co., New York.
Rusden Machine Co., Warren, R. I.
Sturtevant, B. F. & Co., Boston.

Steam Surface Coverings.
Keasbey, Robert A., New York.
Norristown Covering Co., Norristown, Pa.

Steam Specialties.
Butterworth, H. W. Sons Co., Philadelphia.
Rusden Machine Co., Warren, R. I.
Jenkins Bros., New York.
Sturtevant Co., B F., Boston.

Steam Valves.
Jenkins Bros., New York.

Tanks, Tubs and Vats.
Caldwell Co., W. E. 202 Brook St., Louisville, Ky.
Cypress Lumber Co, Apalachicola, Fla.
Lee-Odlum Co., Memphis, Tenn.
Rusden Machine Co. Warren, R. I.
Stearns, A. T, Lumber Co, Neponset, Mass.
Woolford, George, 2240 No. 9th St, Phila, Pa

Tapes, Braids and Edgings.
Cathcart, John, & Co, 115 Franklin St, N. Y
Fleming & Chapin, Philadelphia.
Friedberger Mfg. Co, Germantown, Pa.
Krout & Fite Mfg. Co., Allegheny Ave. and E gerald St., Philadelphia.
Weimar Bros, 1817 East York St, Phila, Pa.

Telephones.
Mianus Electric Co., Mianus, Conn.
Philadelphia Electric Construction Co., Philadelphia.
Plummer, F O. 620 Atlantic Ave., Boston.

Tentering Machines.
See Dyeing, Bleaching Machinery, Etc.

Tension Pulleys.
Ameleetema Oilless Bearing Co., Wayne, Junc., Phila. Pa.
N. E. Ventilating & Heating Co, 930 Manton Ave, Providence, R. I.

Testing Machines.
Howard, Geo. C., 1783 Barker St., Phila., Pa

Towers.
Caldwell Co., W. E. 202 Brook St., Louisville, Ky.
Lee-Odlum Co., Memphis, Tenn.

Trimmers.
The American Machine Co., 420 Library St., Philadelphia.
Excelsior Sewing Machine Co, Philadelphia.

Turbines.
(See Water Wheels.)

Valves—Rubber.
Boston Belting Co., Boston, Mass

Ventilating Apparatus.
Allington & Curtis Mfg. Co., Saginaw, Mich., 81 Wareham St., Boston.
American Air Moistening Co., Boston.
American Blower Co., Detroit, Mich.
Berger Bros. Co., 231-237 Arch St., Philadelphia.
Berry, A. Hun, 23 W. 1st St, Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Mattern, Geo. 44 East 8th St., New York.
New England Ventilating & Heating Co, Providence. R. I.
New York Blower Co., New York.
Philadelphia Drying Machinery Co., 6721 Germantown Ave., Philapelphia.
Philadelphia Textile Machinery Co, Hancock St, above Lehigh Ave, Phila, Pa.
Sargent's, C. G., Sons, Graniteville, Mass.
Sturtevant, B. F. Co, 34 Oliver St, Boston, Mass.

Washers (Cloth).
Birch Brothers, Somerville, Mass.
Butterworth, H. W. & Sons Co., Philadelphia.
Hopkins, Machine Works, Bridgeton, R. I.
Hunt, Rodney, Machine Co, Orange, Mass.
Hunter, Jas, Machine Co, No. Adams, Mass.
Phillips Co, The Thomas, Providence, R. I.
Rusden Machine Co , Warren, R. I.

Watchman's Clocks.
Eco Magneto Clock Co, 620 Atlantic Ave, Boston.
Sanz & Co, 127 Duane St., New York.
Philhdelphia Electric Construct on Co., 1328 Chestnut St., Philadelphia.
Waggoner Watchman Clock Co , Grand Rapids. Mich.

Waterproof Floors.
Warren Bros. Co., 143 Federal St., Boston.

Water Wheels.
Bradway, C. P., W. Stafford, Ct.
Christiana Machine Co., Christiana, Pa.
Hunt, Rodney, Machine Co, Orange, Mass.
Leffel, James, & Co, Springfield, O.

Water Wheel Governors.
Bradway, C. P, West Stafford, Ct.
Cohoes Foundry & Machine Co, Cohoes N. Y.
Leffel, James & Co, Springfield, Ohio.
Lombard Water Wheel Governor Co, 61 Hampshire St, Boston.

Winders. (Hosiery.)
Universal Winding Co, 226 Devonshire St, Boston.

Wire Cloth.
Fraser & Chalmer, Chicago, Ill.

Wood Pulleys.
Saginaw Manufacturing Co, Saginaw, Mich.

Wool Cleaning Compound.
India Alkali Works, Boston.

Wool Combing Machinery.
Crompton & Knowles Loom Works, Worcester. Mass.
Leigh, Evan A. 35 Mason Bldg., Boston.

Wool Extracts.
Garfield Woolen Co, Garfield, N. J.

Wool and Waste Dusters.
Gerry, Geo, & Son, Athol, Mass.
Sargents', C. G., Sons, Graniteville, Mass.
Stillman-Randall Machine Co, Westerly. R. I.

Woolen and Worsted Machinery.
Altemus, W. W, & Co, 2816 N. 4th St, Phila Pa.
American Tool and Machine Co., Boston.
Birch Brothers, Somerville, Mass.
Butterworth, H. W. Sons Co., Philadelphia.
Curtis & Marble Machine Co, Worcester Mass.
Fairmount Machine Works, 22d and Wood Sts, Philadelphia.
Furbush, M. A. & Son Machine Co, Phila, Pa.
Howard, Geo. C., 1783 Barker St., Phila., Pa.
Hunt, Rodney, Machine Co, Orange, Mass.
Hunter, Jas, Machine Co, No. Adams, Mass.
Hunter, Robert 1525 Clearfield St., Frankford, Phila.
Jefferson, Ed, & Bro, 28 Strawberry St, Phila, Pa.
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Roy, B. S. & Son, Worcester, Mass.
Rusden Machine Co., Warren, R. I.
Sargent's, C. G., Sons, Graniteville, Mass.
Schofield, Geo. L., Philadelphia.
Smethurst, Geo. (Gears for Mules), Maynard, Mass.
Stoddard, Haserick, Richards & Co, Boston, Mass.
Woonsocket Machine & Press Co Woonsocket, R. I.

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Fowles & Co, 106 Church St, Phila.

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Becker, Chas. W, Agt, Amsterdam, N. Y
Garfield Woolen Co, Garfield, N. J.
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Whittier Cotton Mills, Lowell, Mass.

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Indian Orchard Co., Indian Orchard, Mass.
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WOOLEN SUPERINTENDENTS.

1682 **Supt. & Designer,** or would take a position as designer and asst. supt. in a good mill at $1500 per year. Has had 14 years' experience in woolen and worsted mills from pattern weaver, loom fixer, boss weaver, designer. Men's wear, wool and worsteds and dress goods. Best of references.

880 **Supt. or Assistant Supt. and Designer.** Over 25 years' experience as supt. and designer. Has designed and manufactured nearly all classes of goods made in a woolen mill, in wool and worsted, such as shawls, blankets, beavers, kerseys, cheviots, fancy cassimeres, overcoatings, worsted suitings, etc. 53 years old; married, with family. Would go West or nearly anywhere. Wants a mill where he can permanently settle and give them the benefit of his experience as a manufacturer. A first-class man.

1683 **Woolen Supt.** Large experience. Last mill where he was employed was for five years overseer and 15 as superintendent. A good man on flannels, sackings, skirtings, woolen dress goods and domestic woolen goods. Well up in weaving, dyeing, carding, etc., and has a general knowledge of all departments in a Western woolen mill. Englishman; married. Refers to past employers.

1674 **Supt.** or assistant in woolen mill. 10 years' experience on cassimeres, cloakings, etc. Well posted on shoddies. First-class references. Strictly temperate. Age 29; American; single.

1386 **Woolen Superintendent or Boss Carder.** Age 43; American. Familiar with the manufacture of all kinds of woolen goods, is well recommended, and can go immediately.

1594 **Supt. of 5 to 10 Worsted** Combing Mill, or asst. supt. in a larger mill, or good position as drawer or drawer and spinner. Wants $3.50. Has worked on fine, medium and coarse wools, numbers principally from 14 to 50 in the gray and fancy mixes. Had seven years' experience in England and 10 years' experience in a mill in this country. Can take place at once.

1610 **Woolen Supt. or Dyer.** Large experience as dyer and assistant supt. on broadcloths, kerseys, dress goods and men's wear. Age 36; American, married.

1387 **Woolen Superintendent,** one who has had a thorough practical experience in setting up and operating woolen mills. Would take charge of small mill or finishing department in large mill. Now employed but wishes to change. Correspondence solicited.

COTTON SUPERINTENDENTS.

1700 **Supt.** of small mill, or carder in a large one. Has had twenty years' experience in the different rooms on plain and colored goods. Age 35; married. Strictly temperate. References first class. Now employed, but could take a place at short notice.

1686 **Cotton Supt.** Age 53; American; married. Large experience. Been in present position as superintendent for a number of years and previously in the same mill as overseer of weaving. Nearly all kinds of goods. Is familiar with nearly all makes of machinery. Refers to past employers.

1706 **Cotton Supt.** Age 39; American. Has started several small mills. Understands business from bale cotton to finished cloth. Has made yarns from 8's to 26's run into plaids, ginghams, etc., and is familiar with most all machinery. Can furnish references. Prefers Southern States.

1608 **Supt. of Yarn Mill.** A young man, 30, married, and competent to fill a good position with credit. Honest, temperate and excellent business training and judgment. Thorough manager and salesman, and keenly alive to conditions of today.

1689 **Supt. or Assistant Supt.** Age 37; American; married. Large experience as overseer and first-class references. At present employed as overseer, but is capable of filling a superintendent's position. Worked on prints, twills, sheetings, cambric and fancies.

1653 **Supt.** of a small mill, or overseer of carding and spinning in a large mill. Has had seven years' experience as overseer and supt. in good mills. Is thoroughly posted on both gray and colored work. Has a thorough knowledge of designing, and understands all makes of machinery. Married, and good habits. At present employed as assistant superintendent in the South.

1673 **Cotton Supt., Carder, and Spinner.** Age 25; English; single. Large experience in English mills. Can take position at once. Has worked on all kinds of cotton machinery.

1532 **Superintendent.** Has been in mill business all his life, and been with the present firm for a number of years, having been promoted several times. He wishes to better himself.

WOOLEN CARDERS.

1696 **Carder.** or secondhand. Experienced on cassimeres, cloakings, blankets, shawls, jeans, and is familiar with Furbush, Bridesburg and Smith cards. Wants position in Western or Southern States. Can take place immediately. Age 30; American; single.

1701 **Boss Carder.** Age 39; English; married. Has had large experience as boss carder in Canadian mills, and has worked in New England mills, also held positions in England before coming to this country. He has worked on all kinds of wool, cotton, waste, mungo and shoddy mixes, cassimeres, dress goods, knit goods and blankets. Can take position at once. Excellent references.

1707 **Overseer of Carding.** Worked for 21 years in a woolen mill as boss carder, but through sickness was obliged to resign his position. Is now ready and wants a situation at once. Age 49; American; married. Wants $3 a day. Has worked on dress goods and flannels.

1643 **Woolen Carder.** Age 45; American; married. Has worked as overseer in first-class N. E. mills for the past 18 years. He is at present employed, but wishes to better himself. Could leave on a week's notice. Has worked on cassimeres, dress goods, flannels and underwear. A good manager of help and thoroughly competent and reliable.

1616 **Overseer of Woolen Carding.** Age 32; American; married. Has had long experience as second-hand on all kinds of stock. Can furnish excellent references as to character, ability, etc.

COTTON CARDERS.

1403 **Cotton Carder** with 17 years experience in N. E. mills as overseer and second hand, now in the South but wants to return North. Has never worked for less than $3.00 but would take $2 50 to change. Married. Age 38. Best of references.

1662 **Overseer Cotton Card Room.** Age 52; American, married. Not employed at present and could take a position at once. Has worked on all kinds of goods in order mills, and is familiar with all kinds of machinery. Refers to former employers.

1593 **Overseer Cotton Carding and Combing.** Now in charg of this department in a large N E. mill. Has had first-class experience and is well recommended. Age 38; married, American. All grades of cotton.

1718 **Second-Hand in Cotton Card** Room. Has had 10 years' experience in N. E. mill. Understands all makes of machines. Can make all changes from 1 to 20 hank. Has taken course in cotton spinning at American Correspondence School of Textiles, New Bedford. First-class references. Would start at $2 00 a day. Young man and strictly temperate.

1720 **First Class Cotton Carder or** Supt. Has had the advantage of a great deal of experience in the various departments, and is thoroughly posted on all details of manufacturing and machinery. Would accept a position North or South. 36 years of age; American; married. Worked on print cloths, twills and sheetings. Has had charge of bleaching.

WOOLEN SPINNERS.

1648 **Boss Woolen Spinner.** 47 years old. 28 years' experience. Worked on all kind of stock, from ¼ to 12 run. Temperate, steady, and refers to past employers. Will work for moderate salary. Not employed and could come at once. Experience on cassimeres, flannels, beavers, knit goods dress goods, blankets, shawls.

1519 **Overseer of Woolen Spinning.** Age 31; married. Has worked on yarns from 1 run down to 5½. Some experience on shoddy. Will work for moderate salary.

1595 **Overseer Worsted Spinning.** 10 years as overseer of spinning, twisting, reeling, dressing, spooling on worsted yarns Englishman; age 41, married. Now employed, but does not like section of country. A first-class man in every respect.

1709 **Worsted Spinner or section** Hand. Age 22 and unmarried. At present employed, but not satisfied with surroundings. Would accept moderate pay.

1601 **Woolen Spinner,** or painter and glazer in any kind of mill. Age 31; Irish; married. Wants $10 50 per week. Has worked on cheviots, overcoatings, broadcloths, satinets, hosiery, yarns, etc.

1647 **Overseer Cotton Mule Spinning.** Seven years' experience as secondhand. Wishes to get an overseer's job. Prefers Mason mules. Age 38; Catholic, married. At present employed Experience on prints, sateens, lawns, twills, etc. Will work for moderate salary.

COTTON SPINNERS.

1636 **Overseer Cotton Spinning, Spooling, Warping, Etc.** Has held position seven years of second-hand and has taken textile school courses. Having had unusual opportunities to learn, he feels competent to take position as overseer. Highly recommended by present employers.

1655 **Overseer of Cotton Spinning.** 42 years old; married. Experience as a spinner covers a period of 30 years in first-class N. E. mills. Has worked principally on fine yarns, 30's to 200's. Had some experience on coarse numbers. First-class references.

1364 **Mules or Frames.** 34 years old; married. Thoroughly understands all makes of English and Mason mules. Has set up machinery and been expert fixer. Wants good position as overseer of mule room, or would take charge of frames. Accept $3.50 per day. Best references.

1663 **Overseer Mule Room.** Eleven years' experience in Fall River mills, and for the past ten years overseer of mule room. Excellent reference from present employer. Age 44, married.

1698 **Overseer of Mules.** 34 years old; married; English. 10 years' experience, chiefly on English mules, on all grades of cotton yarn. Would like to get a large job.

1703 **Overseer Ring Spinning, Warping and Spooling.** Is experienced on white work from Nos. 4's to 30's. Is familiar with Whitin and Lowell Machine Shop spinning frames and spoolers and warpers. Wants $3 per day to start with. Age 39; American; married.

1690 **Cotton Mule Spinner.** Age 42; French; married. Has worked on prints and sheetings and on yarns from 9's to 50's. First class references. Two years' experience as secondhand and five as overseer. Wants $2.50 per day to start with.

WOOLEN WEAVERS.

1654 **Boss Woolen Weaver.** Has had 12 years' experience as fixer and two years' as boss weaver. Has worked on fancy worsteds, cotton worsteds and coverts. Is familiar with Crompton & Knowles machines. Age 37; English, married. At present employed. Can take a position with two weeks' notice.

1482 **Weaver or Wool Sorter.** Has worked on cassimeres, cheviots, tricots, kerseys and cloakings. Good references.

1645 **Overseer Weaving.** Age 30; married, American. Has worked in weave room since he was 17 years old as weaver, fixer and secondhand of weaving, except for a short time was traveling salesman. Has worked on ladies' dress goods, men's fine worsted suitings, overcoatings, cloakings, etc., on Crompton & Knowles and Jacquard looms. Excellent references.

1413 **Boss Weaver or Designer.** American; age 49. Has worked on beavers, kerseys, dress goods, cassimeres and all kinds of men's wear. Is also a good loom fixer.

1712 **Second-Hand or Overseer of Weaving.** Age 29; American; single. Has some knowledge of designing. Has worked on fancy worsteds cassimeres and cheviots. Wants $2.50 per day to start with. Is familiar with Crompton & Knowles machines.

886 **Boss Weaver or Boss Weaver and Assistant Supt.** Age 46; married. Has had large experience, and worked on cassimeres, cloakings and dress goods, Had been in last position, in charge of weaving, for eight years.

1688 **Overseer of Weaving** in large mill, designer in small mill, or assistant designer in a large mill. Age 38; German; single. Has worked on beavers, chinchillas, fine cassimeres, fine fancy worsteds, ladies' dress goods, army goods, union cassimeres and other classes of goods. Strictly temperate and industrious.

COTTON WEAVERS.

1681 **Overseer or Secondhand of Cotton Weaving.** Has had long experience as loom fixer, secondhand and overseer, and can furnish excellent references. Has also had charge of cloth hall and drawing departments. With one mill was 15 years.

1687 **Overseer of Weaving.** Age 30; Scotch; married. Has worked on taffetas, grogran, satins, serges and grenadines, all kinds of plain and fancy cottons and lenos. Is familiar with Crompton & Knowles and Whitin looms. Wants $4 per day.

1668 **Overseer of Weaving.** Age 41; English; married. Has had large experience as loom fixer and secondhand of weaving, and is competent to take an overseer's job. Has worked on shirtings, sheetings, sateens, fancy lenos, and all grades of fine goods all the way from 2 to 28 harness.

1652 **Overseer Cotton Weaving.** Worked on about all kinds of cotton goods. Age 41, American, married. At present employed in the South, but wants to change for a healthier locality. Refers to present and past employers.

1708 **Overseer of Weaving.** Has had 15 years' experience on 12 different kinds of looms and most all kinds of cotton goods. Has worked in some of the largest mills in the South.

KNITTERS.

1084 **Overseer of Knitting and Finishing.** Age 33; married. Has just resigned position in the South on account of climate, and is ready to take place at once. Can furnish best of references.

598 **Boss Knitter or Supt.** Age 48; married. Is thoroughly familiar with the manufacture of all classes of seamless hosiery, and can take any position at short notice.

1694 **Asst. Supt.** or foreman of finishing room. Age 30; married; American. Large experience in first class mills, and excellent references. Thoroughly understands the manufacture of children's, men's and ladies' flat and fleeced lined goods and underwear. Can repair all kinds of sewing machines and can take position at once.

1657 **Foreman Seamless Hosiery.** Age 39; American, married. At present employed, but can take a position at short notice. Has worked on cotton and woolen hosiery. Wants $4.00 per day.

1182 **Knitting Mill Supt.** A practical man, having had charge of each and every department in mill before becoming supt. Can furnish references as to character and ability. Wants to become associated with a reliable firm. Would take an interest in stock company starting a new mill Is familiar with all makes of machinery and all classes of knit goods. Age 40; American; married.

DYERS.

1693 **Dyer.** English, of 30 years' experience on wool, fine worsted yarns, piece dyes, felt cloths, carpet yarns. Understands all the different kinds of indigo vats. Never yet been asked to show recommendations, never before being out of a position, only voluntarily. Would be willing to start in a small place and help to build it up. Understands making soap from all kinds of stock.

1702 **Dyer** or secondhand in hosiery or cloth mill. Age 26; American; married. Nine years' experience. Has worked on hosiery, wool, shoddy and mixed stock. Will work for moderate salary, and can take a position at once. Refers to past employers.

1704 **Boss Dyer.** Age 36; English; single. Is familiar with dyeing cotton yarn and warp both for bleaching, fulling and other purposes. Has dyed for the best firms in England, also for export work.

1714 **Cotton Yarn Dyer.** Age 36; Scotch; married. Has had 15 years' experience on fast shades. Wants $4.00 to start.

1505 **Boss Dyer** on all classes of wool, woolen and worsted yarns, cotton warps, indigo, etc. Desires to change to better himself.

1727 **A Young Man** capable in dyeing cotton, wool, silk and mixed goods, testing of aniline colors and chemicals, would like a position with some large concern where he could gain experience in his several branches. Can give best of references as to ability, honesty, etc.

875 **Overseer of Dyeing.** Age 34; American; single. All classes of wool, woolen and worsted yarns, indigo on worsted yarn and piece dyeing. Not at present employed, and can take position at once. Wants $3.00 per day.

DESIGNERS.

1635 **Designer** on colored cotton dress goods, and shirtings, and fancy worsted dress goods, piece dye, jacquard work in cotton, silk filling, also lappets. Would not consider position paying less than $1200 a year. Is at present employed in one of the leading mills, making fancy cotton, and is an especially bright young man. Early training in Scotland. Has been in this country about four years

1621 **Designer or Assistant Supt.** on men's wear worsteds, cotton worsteds, overcoatings, cassimeres. High and low stock. Has been designer in several first-class mills. Age 34; married.

1672 **Designer, Overseer of Weaving**, or assistant supt. Age 26; English; single. Has worked in various mills in England and this country. Holds first honors diploma for weaving and designing (London City Guilds). Fancy worsteds, dress goods, colored and fancy cotton goods.

1622 **Designer or Assistant Supt.** in woolen mill. Has made a specialty of steamer rugs and plaid back dress goods. Will start at $3 a day. Desires to change from present position on account of wife's health. An excellent opportunity to secure a first-class man at moderate wages.

1591 **Designer** on fancy worsteds, cotton worsteds, fancy cassimeres, tweeds, fancy back overcoatings, etc. Experience in first-class N. E. mills. Age 30. At present employed, but can accept position at once.

FINISHERS.

1526 **Foreman of Finishing Room**, Folding Packing, etc Age 45; married; English. Has worked on white and colored goods and prints. Is acquainted with every kind of machinery used in his business. Has worked 11 years in this country. Can give good references.

1351 **Boss Woolen and Worsted Finisher** is looking for a position paying $3.50 or more. Age 31; Has worked on all classes of woolen and worsted goods. Can furnish excellent references.

1658 **Overseer Woolen Finishing** Age 35; married. A number of years' experience as overseer in first-class N. E. mills. Worked principally on kerseys, meltons, unions and cassimeres, and is familiar with Curtis & Marble, Parks & Woolson and Cleveland machines. First-class references.

1716 **Finisher.** Age 29; English; married. Has worked as wet finisher, shearer, gigger, second-hand and overseer. Prefers a mill making cassimeres, worsteds, dress goods and face finished goods. A high grade of goods. Is familiar with all kinds of American and English finishing machinery, and can keep same in the best of repairs. Prefers Eastern States. Can take position at one week's notice. Best of references.

1692 **Cotton Finisher and Corduroy** Cutter. Age 31; English; married. Large experience in England and in this country. All classes of corduroys and velvets, cutting, etc., singeing and finishing of cords. Can furnish excellent references.

1729 **Overseer of Finishing.** Age 46. 20 years' experience as overseer on all kinds of woolen and union goods Thoroughly posted on finishing low to medium grade of wool warp and cotton warp fancy cassimeres, overcoatings, cloakings, worsted suitings, also steam finished goods. Good references from present employers.

MISCELLANEOUS.

1731 **Young Man of 32 desires to go** to Japan. Is temperate. Been twenty years in cotton mill, and has had experience on many kinds of looms, including Draper. Has best of references. Holding a good position in mill now.

1721 **Asst. Supt. or Designer.** Age 27; American; single. Has worked on all classes of colored cotton goods, plain and fancy, and gray goods. Wants $1200 per year, and can take position immediately.

1723 **Dresser Tender.** Age 42; married. 15 years in a mill as overseer. Is familiar with all makes of machinery. Can take place at once.

1715 **Second-Hand in Cone Winding** or Spooling Room. Age 24; single. Has worked on all kinds of White and colored yarns from 4 to 60. Is familiar with Foster, Broadbent and George W. Payne machinery.

1583 **Cloth Room Overseer.** A young man having good experience as overseer in plain and fancy mills desires to change. Has worked on nearly all classes of cotton goods, and is recommended as a first-class figurer and good manager of help Can take charge of cloth department and shipping where both positions are combined, or would accept position as office assistant. American; married.

1711 **Mill Engineer and Draughtsman.** American; married. Would take up other responsible duties in connection with engineering work. References of the highest character, and salary expected quite reasonable.

1713 **Foreman of Picker Room, or** Painter for some mill and weaver in winter or any other winter work. Wants employment year around. Is an all around man in woolen mill. Has worked on beavers, blankets and fancy dress goods. Wants $2 per day to start.

1726 **Superintendent** broad silks from time of leaving weave room till ready for consumer, piece dye cotton and silk mixtures included, or will accept overseership in any department connected with above. 35 years old; American; married. Is familiar with most all machinery used in this branch.

1685 **Boss Dresser or Assistant Designer.** Has taken a thorough course in designing, and is well up in calculations and in the making of fancy men's wear goods of all kinds. Has worked in Scotland and three years in this country. His knowledge of yarn calculations and practical experience as dresser tender makes him well fitted to fill a position as boss dresser and to run a room in an up to date and efficient manner, or to fill a position as designer or assistant.

1695 A young man would like to obtain a position in some Southern cotton mill as assistant supt., or some such position, where he would have an opportunity to learn the business thoroughly. Has theoretical and some practical knowledge.

1639 **Silk Supt. or Boss Weaver.** Experience covers ribbons, piece goods, velvets, jacquard, plain and plaids. Has had practical experience as loom fixer, designer and overseer. Early training in Germany and later in some of the best silk mills in this country. Also understands manufacture of corduroy.

1566 **Wanted by a good practical man,** a position as overseer of slashing, warping, beaming and spooling. Now employed, but would change for a position in a first class Northern mill.

1626 **Dyer and Finisher,** with experience on plushes, dress goods, mohair and worsted genapped yarns, cotton and woolen yarns, raw stock. At present employed, but will consider position paying $3 a day.

1492 **Boss Knitter.** Age 27; single; American. Worked in New York State mills. Is familiar with Campbell & Clute, Tompkins, McMichael & Wildman, Scott & Williams, Nye & Tredick machinery. Single and double plush work, balbriggan, etc.

1577 **Assistant Supt. or Designer.** Has had experience as designer on beavers, kerseys, cassimeres, cheviots and wool, worsted and cotton novelty dress goods. A graduate of Philadelphia Textile school. Has had practical mill experience as loom fixer on Knowles & Crompton looms, dresser and beamer, also in office work, book-keeping, calculations, etc. He is at present employed. Age 25, single.

1599 **Assistant Designer.** A young man who is studying woolen and worsted designing would like an opportunity to get practical experience, and will accept very small wages Has worked in mill for two years as weaver on Crompton & Knowles looms. Excellent references as to character.

1427 **Second Hand Cotton Piece** Dyer. Age 38. Married. Worked on canton flannels, sateens, drills, ducks and all kinds cotton piece goods Was 12 years in one mill as second hand. At present employed but can leave at once. Well recommended.

1644 **Overseer Aniline Black and Turkey Red Dyer** Has had ten years' experience as secondhand in mill where he now is, but wishes to change to better himself. Can take a position at once. Has worked on sateens, cambrics and linings of all kinds. Age 24; English, single.

1606 **Woolen Supt.** 24 years' experience as supt and manager. Several years manager of his own plant. At present out of position owing to consolidation. Would make a successful manager of a moderate sized plant, making plain or fancy cassimeres, doeskins or felt goods. Best of references.

1677 **Woolen Carder.** Worked on cotton, wool and shoddy, also worsteds. Age 33; American; married. Has had about nine years' experience. At present employed as overseer, but wishes a larger salary. Worked on all different makes of machinery. Excellent references.

1057 **Boss Dyer** on cotton, woolen, merino hosiery, yarns, piece dye dress goods, rubber linings, felts, fast blacks, also mercerized cotton yarns and hosiery. Would expect good wages and can show excellent references.

1371 **Supt. or Manager.** Age 25; single. Wishes to obtain a position in the South, Georgia preferred. Can accept position at once. Has had experience on all kinds of cotton hose and half hose. Strictly temperate. Good certificates.

189 **Cotton Superintendent** wants position in Northern mill. Has been in charge of Southern mills for 7 years. Previous experience in N. E. Is well known among mill men, and can furnish the best of references. Age 39; married.

1415 **Dyer.** Now out of work on account of the mill being stopped. Aged 30, and married. Will start for small pay. Accustomed to Beavers, Broad and Carriage cloths, Repellents, fancy Cassimeres, Raw Wool and Cotton, light shades or piece dyes. Refers to past employers.

1571 **Woolen Salesman,** who has filled successfully all positions in woolen jobbing house, desires a position with manufacturer or dealer in textile goods. Fine business qualifications and A 1 references.

678 **Woolen Spinner.** 18 years' experience as overseer of spinning and carding. Can handle both departments. Would take position in the West. Best of references. Age 43; married

1684 **Dyer.** Age 30. Been in business 12 years. Wants position at once. Will go anywhere. Is familiar with long chain, short skein and raw stock dyeing, and carpet warp.

1513 **Boss Dyer.** Age 35; married; English. Has worked on underwear, piece dyes, raw stock and mercerized goods. Is acquainted with all makes of dyeing machinery.

1630 **Boss Carder or Comber.** 10 years' experience as second hand of carding and combing. Would like to secure an overseer's position at $3.00 a day. Has worked on all grades of foreign and domestic wools and is highly recommended by present and past employers. Englishman; age 25, married.

1476 **Boss Dyer.** Experience on kerseys, broadcloths, dress goods, cassimeres and worsted piece dyes. Has been in good mills for 3, 5 and 7 years and gave satisfaction. Would start in New England or Central States for $3.00 a day.

1561 **Boss Dyer,** with long experience on all kinds of worsted, serges, cloakings, flannels, repellants, kerseys, also all wool, cotton and silk. Best of references. Age 35; married.

1638 **Boss Woolen Carder.** Long experience in N. E. mills on both high and low grades. Would consider $3 a day. Excellent references.

1660 **Overseer Carding.** Does not want to go out of N. E. States. Age 48; American, married. Many years' experience as overseer, and has excellent references. Has worked on nearly every class of goods manufactured in N. E., and is familiar with nearly all machinery.

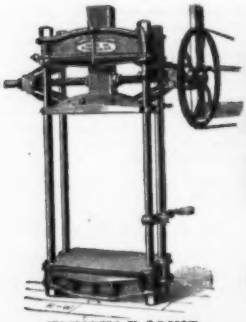
1630 **Boss Carder or Comber.** 10 years' experience as second hand of carding and combing. Would like to secure an overseer's position at $3 a day. Has worked on all grades of foreign and domestic wools and is highly recommended by present and past employers. Englishman; age 25, married.

1320 **Boss Cotton Carder.** Has been overseer for 12 years Is at present employed, but desires to change for good reasons Would accept $2 50 a day. Age 40; American, married.

1597 **Boss or Second-hand Underwear Knitter** Can accept position at once. Experience covers men's, women's and children's high, medium and low grades. Scott & Williams, Nye & Tredick, Snyder & Fisher machines.

1554 **Boss Knitter.** Underwear, Jersey ribbed, lisle, wool, plaited work, silk Can handle any latch machine. Good references. Age 26; married.

1376 **Overseer Finishing.** Age 35; American, married. At present employed, but can take position at week's notice. Experienced on fancy worsteds, kerseys, cassimeres, cloakings, carriage and casket cloths, dress goods, meltons and cadets. Can furnish good references as to character and ability.



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BOOMER & BOSCHERT

BALING PRESSES

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338 West Water St., SYRACUSE, N. Y.

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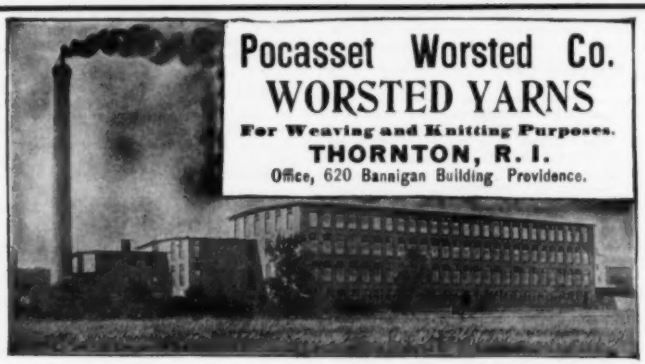
EASTON AND BURNHAM MACHINE CO.,

Pawtucket, R.I.

ALL KINDS OF Spindles USED IN THE MANUFACTURE OF COTTON, WOOL & SILK

IMPROVED UPRIGHT SPOOLERS

TO SPOOL FROM COP, SKEIN, OR BOBBIN.



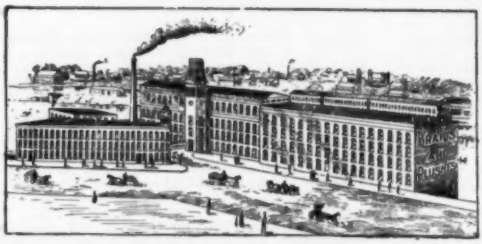
Pocasset Worsted Co.

WORSTED YARNS

For Weaving and Knitting Purposes.

THORNTON, R. I.

Office, 620 Bannigan Building Providence.



FLYER SPUN

Mohair and Worsted

YARNS.

Mohair Plushes,

Worsted and Cotton Braids.

D. COFF & SONS, Pawtucket, R. I.

ESTABLISHED 1861.

YARN DEPARTMENT.

Eastern Yarn Market.

Cotton Yarn: Spinners continue busy, with prices firmly maintained. Knitters are rushing goods forward in order to meet requirements for deliveries. The feeling seems to prevail that orders delivered will be safest which are delivered to purchaser. There can be no doubt that the warm winter has left many goods over from last year and that the Eastern trade is better for immediate delivery than the Western trade. Knitters are therefore working day and night to get out these orders and are working on orders from yarn purchased when it was not so high as at present. There is great complaint from knitters, who own yarn to be delivered at low prices, that their shipments are held up for those who have orders in at higher prices. There seems to be a great rush to get as much out of the consumer of yarn as is possible. At any rate when the next season starts, the knitter will be entirely cleaned out of yarn and contracts, and will have to advance prices to such an extent that jobbers will have to meet the full advance for underwear, and that will mean that more orders will be placed on woolen underwear.

The demand for cotton-worsted continues, and yarn going into this class of cloth is firmly maintained with an advancing tendency. The weavers claim that at the prices asked for yarn the margin of profit is greatly reduced. Some of the weavers cannot procure enough to fill out orders promptly. The Southern spinners who furnish this yarn, at their meeting on the 12th, voted to advance the schedule still further. It is said that some of the Southern mills are stopping their looms and furnishing the yarn as more money is made selling the yarn than is made selling cloth. Combed yarns continue high and much uneasiness is felt by the knitters of balbriggan underwear, who are loath to lose their business, but who feel that the buyers of these garments will not pay price with the advance of nearly 100 per cent. We know of one large hosiery mill which is about to put up a combed yarn plant. Others state that they will not engage in cotton yarn spinning, because, with the immense increase of spinning in the South, in a year or so the cotton spinners will be in the same condition that two years ago saw them, when the Howland mills in New Bedford were selling yarn at less than cost in order to make a showing. They attribute the present demand for cotton yarn to the great advance in wool, and that when values are once established the demand for cotton yarn for underwear and cloth will be materially reduced.

The American cotton trust on fine yarn and thread do not seem to have advanced prices to any great extent. Prices for yarn, at this writing, are well maintained, with an advancing tendency. Orders are being freely placed for carded yarn of Southern and Eastern make.

Worsted Yarn: Spinners continue busy on 1/4 to 3/8 blood yarn in sizes from 2/32s to 2/6s. On fine yarn the trade is quiet and few orders are being placed. The dress goods weavers continue busy on old orders, but there seems an inclination on the part of buyers, who had ordered heavily, to cancel orders, and in consequence mills will have more cloth to sell later in the season. The demand continues for rough effects with the trend of business for smooth cloths. Next season will show a good demand for Oxford mixes and prebble cheviots in dress goods. There is a move on the part of weavers to cancel orders for yarn, as there is an unmistakable decline on the part of some of the spin-

Frank E. Patterson, Prest. Oscar W. Wood,

Germantown Spinning Co.

COTTON CARDED

HOSIERY YARNS

In numbers from 6s to 26s.

Germantown, Philadelphia.

W. Warren Thread Works,

SPOOL COTTON

on 100 to 12,000 yd. Spools or Tubes.

A Specialty of Thread for Manufacturers Use

on Spools, Tubes or Bobbins.

Also Seaming and Hosiery Yarns

on Cones, Tubes or Skein.

Our bleaching and dyeing facilities are new and unsurpassed for prompt and neat work. Correspondence solicited.

WESTFIELD, MASS.

The Best is the Cheapest.

It is BETTER and CHEAPER to wind yarn by the "Universal" system before shipment from the mill, thus insuring perfect delivery to knitting machines without rewinding.

UNIVERSAL WINDING CO.,

F. H. BISHOP, Manager.

226 Devonshire St., - Boston, Mass.

ners. The spinners who had orders endeavored to secure a material advance. The weavers met this move by placing orders with other spinners. The original spinners finding they had lost the business are now trying to get back by making concessions.

The dress goods manufacturers are getting out samples of Oxford mixes in 2/20s and 2/28s. The astrachan trade is also getting out samples. The top manufacturers are beginning to slow up as there is less demand for tops at present. There are some orders being placed for lustre tops. We note that several weavers are putting in combing and spinning to more successfully compete with the woolen trade. Spinners of French spun yarn continue busy with a continued heavy demand for yarn. Sizes most in demand range from 1/18s to 1/40s. Weavers of men's wear continue busy on cotton worsteds, also cloth out of 1/4 and 3/8 blood yarn.

Manufacturers of fine cloth have but few orders; the impression seems to be, however, that buyers are holding out of the market, and will be forced to purchase largely later, but on a lower basis of prices. Spinners continue to run on old contracts which will soon run out. Many of them who have depended on the trust will not secure the heavy orders the coming season, and are making arrangements to handle a different line of trade. The mills throughout the country appear to be busy, but are buying nothing. It seems that many of them loaded up last November, because they had orders which had to be filled at a certain price or not at all, and in consequence purchased enough to last until November. The spinners and the wool dealers made the money by selling. Those dealers who over-bought and the manufacturers who purchased were "stuck," and are not anxious to repeat the operation, and are buying cautiously. The "boomers" who have worked the market up to the present condition will find that a retrograde movement is in

CATLIN & CO.,
YARNS.
67 Chauncy St., Boston
216 Church St., New York.
206 Chestnut St., Philadelphia.

Walcott & Campbell Spinning Co,
IROQUOIS MILLS.
FANCY HOSIERY YARNS
IN ALL COLORS.
New York Mills, Oneida Co., N. Y.

JAMES E. MITCHELL & CO.,
Commission Merchants.
122 & 124 Chestnut St., Philadelpia, Pa.
74-78 Summer St., Boston.
Cotton, Woolen & Worsted Yarns
All numbers on Hand and Made to Order.

TUCKER & COOK MFG. CO
MANUFACTURERS OF
WHITE AND COLORED COTTON **WARPS**
Nos. 6s to 30s,
On Beams, Jack Spools or in Chain
CONWAY, MASS.

GRANT YARN CO.,
COMBED AND CARDED COTTON.
YARNS 40s and above. AND
FITCHBURG, MASS. **WARPS**

E. JENCKES MFG. CO.
Colored Cotton Hosiery Yarns,
Double and Twist Yarns for
the Weaving Trade.
PAWTUCKET, - R. I.

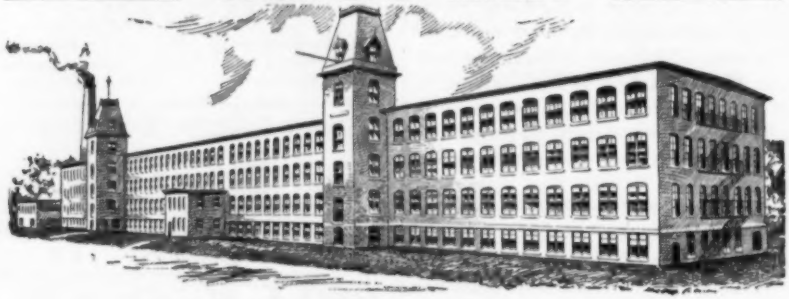
LINEN YARN IMPORTER.
Hughes Fawcett, 115 Franklin St., New York,
Flax, Hemp & Jute Line and Tow Yarns,
FOR WEAVING PURPOSES
Linen Jacquard Harness Twines.
Fine Cotton Harness and Heddle Twines.
For Cotton, Silk, Woolen and Carpet manufacturers. Correspondence solicited. Samples promptly furnished

Eddy & Street,
COTTON, **YARNS** WORSTED,
WOOLEN, AND SPUN SILK.
BRAIDS
PROVIDENCE, R. I.

CAPACITY, 50,000 Spindles.

ORSWELL MILLS

FITCHBURG MASS.



COMBED OR CARDED

COTTON YARNS

In Chains and Skeins, on Balls, Beams, Spools—single or twisted.

WILLIAM FIRTH, PRESIDENT. FRANK B. COMINS, TREASURER.

AMERICAN MOISTENING COMPANY,

150 Devonshire St., Boston, Mass.

The "Drosophore" and "Vortex" Humidifiers.

Legal proceedings will at once be taken against infringers and users of infringements.

WE HAVE, WITH INSTALLATIONS IN HAND, ORDERS FOR OVER 2,000 HUMIDIFIERS.

COTTON YARNS

from 2s to 26s single and ply.

SPECIALTY—FIRE HOSE CORD

and Yarns put up on tubes wound on Universal System.

WHITTIER COTTON MILLS, - - Lowell, Mass.

INDIAN ORCHARD COMPANY,

Indian Orchard, Mass.

Manufacturers of - - - -

COTTON WARPS AND YARNS

In gray and all colors, single or in any twist.

COLORED COTTON

Machined, Carded or in Roving.

NOVELTY YARNS

In Cotton, Mercirized Cotton, Silk and Worsted, in various Patterns, Colors and Twists.
We are always pleased to assist our patrons of the Woolen Goods manufacture in special pattern warps for samples.
We use a uniform grade of long stapled cotton in all our manufacture.

order before they will be able to catch the unwary again.

It will be interesting to know that high-priced wool is having the same effect on the trade in Europe as here. The manufacturers are using cotton and woolen waste, and shoddy, and the spinners are running cross-bred wools rather than take chances on fine merino with their exaggerated prices. We believe that the season will be as late on heavy-weights as the light-weights have been, and that the finer class of cloth will be bought in good quantities later. We believe that there will be a lower range of prices on fine worsted yarn and that medium and ⅝ and ¼ will hold their own.

Woolen Yarn: Spinners continue very busy with orders which will last until November or December, and spinners are having large demand from weavers of cheap overcoatings, also from knitters. The demand from weavers continues, and they are sending orders and offers of orders to spinners who are unable to fill them. It looks as though there was to be a renewed demand for woolen goods, as many of the orders come from weavers who heretofore have run worsted yarn exclusively. The knitters are ordering cautiously, and from hand to mouth, as each time wool is purchased they are able to get lower prices. Business is good with knitters, and the demand for woolen hosiery is in a healthy condition, and will be more so, as the price of French spun yarn has been so high that buyers are getting woolen spun yarn to fill orders.

There is a good inquiry from the trade requiring yarn for caps, sweaters and goods of that description. There is a growing demand for Australian thread waste, and it is to be noted that this class of stock is the first to be imported under the Dingley tariff law. Knitters purchased largely in November and December, and are anxious to see prices maintained. The wool dealers, however, are making concessions with very few sales at the present writing. The new wools are being offered at an advance of about 17 cents per pound over the beginning of last season. The wool dealers who sold early sold at the lowest prices and the manufacturers who in many instances bought late in the season lost money by buying at high prices. The consequence is that the dealer who sold early did not make the profit he expected, and could have made, had he waited, and the manu-

A. HERBST. J. W. JONES
HERBST & JONES,
KENNEBEC WORSTED MILLS.
Successors to Kershaw Worsted Co.
WORSTED YARN SPINNERS,
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C. MOORE & CO.,
MANUFACTURERS OF
TWINES, THREADS AND YARNS.
Jacquard Harness Twines of all kinds on hand and made to order.
S.W. COR. FIFTH & MARKET STS.,
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Bristol Worsted Mills,
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FRENCH AND BRADFORD SYSTEMS
B. F. BOYER & CO.,
WORSTED YARNS
IN WHITE AND MIXES.
Woolen and Merino Yarns
OFFICE AND MILL
Delaware and Cooper Sts.
Camden. N. J.

DEXTER YARN CO.
Cotton Yarns in Cops, Cones and Skeins; on Beams or Spools, Single and Twisted. Cable Cords and Twines.
PAWTUCKET, - R. I.

NEW ENGLAND THREAD CO.,

MANUFACTURERS OF

SPOOL COTTON IN NUMBERS FROM 8 to 100,

In All Grades and Lengths on Spools and Tubes.

Seaming Yarns on Cones; Polished Threads and Yarns on Bobbins.

DYEING AND BLEACHING of All Kinds of Yarns and Narrow Fabric a Specialty. Best of Spring Water for Bleaching.

PAWTUCKET, R. I.

Knitting and Weaving Yarns

Cones, Cops, Warps, Skeins,
Single, Double, Three-ply, etc.
Peeler, Egyptian, Mixed Colors.
Large Assortment.

EDWARD S. HYDE, 223 and 225 Chestnut Street, **Philadelphia, Pa.**

CREENE & DANIELS MFG. CO.,

COMBED, CARDED AND GASSED

Yarns, Threads, Twines and Chain Warps,

Colored and Bleached Yarns Furnished in any manner desired by the trade. **PAWTUCKET, R.I.**

The J. R. MONTGOMERY CO.,

WINDSOR LOCKS, CONN.

Manufacturers of

Mercerized Cotton Yarns. GIVES THE HIGH SILK-LIKE LUSTRE IN KNIT GOODS AND WOVEN FABRICS

Novelty Yarns. BOUCLE, BOURETTE AND SPIRALS, IN COTTON, WOOL, WORSTED, MOHAIR AND SILK,

Cotton Warps. ON BEAMS, JACK SPOOLS AND TUBES. IN FANCY TWIST COLORS AND PRINTED.

HAYES, O. H. & CO.

Representative Lines of Woolens

O. H. HAYES & CO.

Liberal arrangements made with manufacturers or men controlling mills' productions.

facturer who bought late can buy for less on today's market, and in fact owns wool which cost him a high price. This result will make a waiting market. The wool grower, however, will have to meet the ideas of the buyer at last.

The foreign wool market, which the trade must not lose sight of, is reported as being weak. The Boer war is a great factor in depressing the London wool market and at the next sales which begin May 8th, some great declines may be looked for and a great loss of money by the dealers who bought early in the season.

We must not, however, expect to see too great a slump here. In the old times, when the London market was off, our own market worked the other way. We look for a good steady business in this country, as we must remember we have a protective tariff. What is happening now in Europe should have happened twelve months ago. Europe lost the American market both for wool and manufacturers of wool, and are now beginning to feel the effects of the changed conditions and the loss of American consumption.

Philadelphia Yarn Market.

The price of cotton has recently been somewhat weaker than formerly, and there seems to be some difference of opinion in regard to the supply, although the position is still undoubtedly strong. General opinion is, however, that cotton is high enough even with the present statistical outlook. The larger mills and the best mills are sold up ahead on yarns, for several months, so there is no necessity for pressure to sell, even with a lighter demand, and the demand is somewhat easier today. We have not heard of any concessions being made on the list price, and no weakness noted, only where some yarns, in especially great demand, were pushed up to unheard of prices. This is notably in two-ply, as 2/40s and 2/30s warps and skein. The probability of a large crop of cotton will influence the trade in some ways. It will be five months before the new crop will be in the market, and possibly may change this year, same as it did last, in that time, as a heavy crop was expected last year, until late in the fall. We quote today prices about as follows:

Warps:—

20/1	20¼ to 21

WAVERLY WORSTED CO.
SPINNERS OF
WORSTED YARNS
FOR WEAVING AND KNITTING.
Main St. & Green Lane, Manayunk, Philadelphia.

DAVIDSON & BROOKE,
ORIANNA BLEACH WORKS,
Bleachers
Of Turkish Towels, Cotton Yarns, Underwear, Tapes and Hosiery.
2562-62-64 No. 3rd St., PHILA., PA.

EICHMANN & STERNBERG
530 Broadway cor. Spring St., NEW YORK.
Mercerized, Turkey Red, Gassed } Cotton Yarns.
Jacquard and Harness Twines.

Incorporated 1899.
AMERICAN COTTON YARN EXCHANGE
Long Distance Telephone, Boston 1100.
AMERICAN
Cotton Yarn Exchange
COMBED AND CARDED COTTON YARNS
From Northern and Southern Mills.
American, Egyptian, Peruvian and Sea Islands.
ARNOLD B. SANFORD, Pres. and Gen. Mgr.
67 Chauncy St.,
BOSTON, - - MASS.

HOWLAND CROFT, SONS & CO.

LINDEN WORSTED MILLS.

Fine Worsted Yarns

OFFICE AND MILLS:

Broadway and Jefferson Ave., Camden, N. J.

Represented by FIRTH BROADHEAD,
937 Banigan Building, Providence, R. I.

ALLEGHENY WORSTED MILLS,

Thomas Wolstenholme, Sons & Co., MANFRS. OF

ALL NUMBERS SINGLE AND TWO-PLY,

Worsted YARNS,

Sell Direct,

on Cop or in Skein, for Weaving and Knitting Purposes, in White, Natural & Fancy Mixes

Office and Mills: Frankford Ave. and Westmoreland St., Phila., Pa.

CRANSTON WORSTED MILLS.

Worsted and Mohair Yarns — white or colors, in skeins, on spools, cones, or shuttle bobbins.

NOVELTY YARNS — of Mohair and Worsted. We are the only manufacturers in the United States making these yarns from the raw material to finished product and making Yarns **only.**

CENAPPED YARNS of all kinds. Doup Yarns. Harness Yarns. For Braids, etc.

...Dyers of Yarn and Slubbing...

BRISTOL, R. I.

George Campbell & Co.

Worsted Spinners.

Yarns, both French System and Bradford.

Knitting Yarns in all Grades and Mixes.
All Numbers to 60s.

21ST STREET AND WASHINGTON AVENUE, PHILADELPHIA.

MALCOLM MILLS CO.,

MANUFACTURERS OF

Novelty Yarns, Silk Noil Yarns, in Fast Colors AND White.

Mills, Frankford, Pa. Office, 220 CHESTNUT ST., PHILA.

22/1	21½
26s	22
16s	19
14s	18
14/2	20 to 20½
16/2	21 to 22
20/2	23½ to 24
30/2	28 to 30
40/2	38 to 40
8/3	16½ to 17

Skein:—

8s to 10s soft	17 to 17½
14s	18½ to 19
16s	19
20s	20 to 20½
19s	20 to 20½
8/3	16
14/2	19½ to 20
20/2	23 to 24
16/2	20 to 20½
30/2	28 to 30
9/4 slack	18½ to 19
12/3 slack	18½
16/4 slack	19 to 19½
16/3 slack	19 to 19½

Southern cones (various qualities):—

6s to 8s	17 to 18
10s	18 to 18½
14s	19 to 19½
16s	20 to 20½
18s	20½ to 21
20s	21 to 21½
22s	21½ to 22½
24s	23 to 24
30s	27 to 28
40s	35 to 38

Shuttle cops:—

6s to 8s	17 to 17½
10s	17½
12s	17½ to 18
16s	18

Eastern hosiery yarn, basis 18¾ to 19¼c. for 10s cones. Rise ¼c. per number to 15s. Cones, ¾c. per pound above cops.

Combed and carded Egyptian in good demand. Prices very high and at late deliveries.

Worsted yarn somewhat easier. Prices are off 3 to 5c. and more on finer counts. ¼ to ⅜ on blood are in better demand.

Demand for merino and woolen yarns somewhat slacker, although mills are still fairly busy.

SILK NOILS AND SILK NOIL YARNS
IN WHITE AND COLORS.
MOHAIR LOOPS, KNOTS, AND FANCY YARNS FOR DRESS GOODS AND CLOAKINGS.
A. T. SKERRY & CO., 47 LEONARD ST., NEW YORK.

YARNS
SOLIS : : BOSTON.
179 Devonshire Street.
ANDREW J. SOLIS, Jr. & CO.

MONUMENT MILLS,
Manufacturers of
White, Colored, Fancy and Double and Twist, COTTON WARPS
HOUSATONIC, MASS. 4s to 60s.

C. J. LITTLEWOOD & SONS, Ltd.
ALBION
DYE and BLEACH WORKS,
MANAYUNK, PA.
DYERS of Cotton, Cotton Yarns, Wool and Raw Stock Generally. BLEACHERS of Cotton and Cotton Yarn.
CITY OFFICE: 132 Chestnut Street. Telephone Connection,
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CHENEY BROTHERS,

SILK MANUFACTURERS.

ALL KINDS OF

Knitting Silks, Ribbons AND Piece Silks,

USED FOR TRIMMING KNIT GOODS.

TRAMS, ORGANZINES and SPUN SILKS, in the Hank, or on Spools or Cones, for Manufacturers' Use. Silk for Special Purposes Made to Order.

MILLS: South Manchester and Hartford, Conn.

SALESROOMS: 477, 479 and 481 Broome Street, NEW YORK.
929 Chestnut St., PHILADELPHIA.
79 Chauncy Street, BOSTON.
186 Franklin Street, CHICAGO

WILLIAM RYLE & CO.,

DEALERS IN

Domestic Thrown Silk of every description. Fine Pure Dye Silks for the woolen trade a specialty. Foreign and domestic

SPUN SILK YARNS AND NOILS

Importers of European and Asiatic Raw Silk.

54 Howard St., cor. Mercer St., - NEW YORK.

THE SECRET

of our popularity is no secret to our customers Experience has taught them that we give them better work and better service than they can get elsewhere.

T. BROPHY'S SONS, Jasper Street above Clearfield Street, PHILADELPHIA.

Dyers of All Kinds of Yarn and Cotton Warps.

EUGENE F. FREUND

New York

STUDIO AND OFFICE
140 MAIDEN LANE

Designer of

COTTON, WOOLEN AND SILK DRESS GOODS, TIE SILKS, RIBBONS, WARP AND SURFACE PRINTS, UPHOLSTERY, DRAPERY, CARPETS, CURTAINS, CHENILLE, Etc. . .

PROVIDENCE DYE WORKS.

Dyers and Finishers,

COTTON YARNS, Suited for HOSIERY and WEAVING Cotton, Woolen and Worsted DRESS GOODS, Woolen and Worsted Mixed CASSIMERES and CLOAKINGS, also Woolen and Worsted Slubbing, COTTON YARN and WARP DYERS and BLEACHERS.

FIRTH & FOSTER CO.,

OFFICES: Philadelphia, 546 Bourse Building.
New York Office, Silk Exchange, Broadway and Broome St.
WORKS: Taylor, Emerald and Adams St., Kensington, Philadelphia, Pa.

R. GREENWOOD & BAULT,

GLOBE DYE and BLEACH WORKS,

Frankford, Philadelphia, Pa.

Dyers, Bleachers and Mercerizers of Warps and Skein Dyeing.

HOME BLEACH AND DYE WORKS,

PETER B. McMANUS, Proprietor.

Dyers and Bleachers of Cotton Yarns,

PAWTUCKET, R. I.

Pawtucket Dyeing & Bleaching Co., BLEACHERS AND DYERS OF

COTTON YARNS AND STOCKINET.

OFFICE WITH BLODGETT & ORSWELL CO., Manufacturers of Glazed Yarns,
28 BAYLEY ST. PAWTUCKET, R. I.

DUNCAN & BAILLIE,

COHOES DYE WORKS, NEWCOMB STREET COHOES, N. Y.

Dyers of Raw Cotton, Wool and Knit Goods.

Satisfaction Guaranteed.
Capacity 10,000 lbs. per day. Prompt Deliveries.

THE WM. H. LORIMER'S SONS CO.,

MANUFACTURERS OF

MERCERIZED YARNS FOR ALL PURPOSES.

Ontario and Lawrence Sts., - PHILADELPHIA, PA.

FAST COLORS

For Wool, Woolen and Cotton Yarn and Piece Goods Dyeing, and for Calico Printing

ALIZARINE RED, PASTE AND POWDER.

Alizarine Blues, Oranges, Browns, Yellows, Maroon, Gray and Black.
Cœruleine, Galleine, Mythylene Grays.
Thionine Blues, Thionine Indigo, Solid Green and
PATENT BLUES (superseding Extracts of Indigo on account of fastness and color bloom) for Wool and Silk, Benzidine and Primuline Colors, Zinc Dust, Aniline Salts and Oil.

VICTOR KOECHL & CO. 122 HUDSON ST., NEW YORK.

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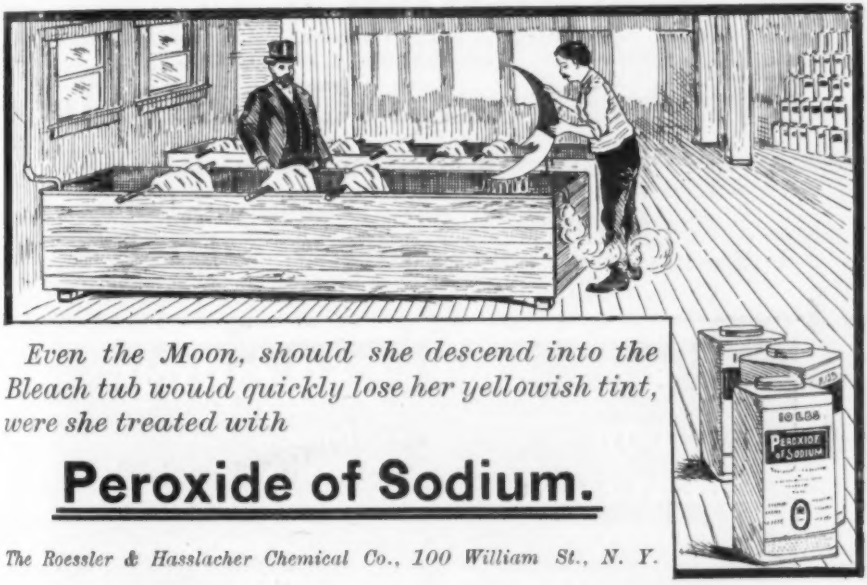

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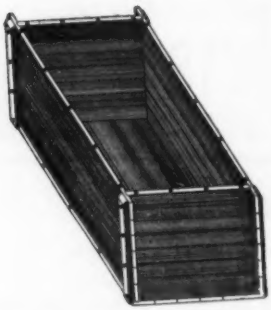

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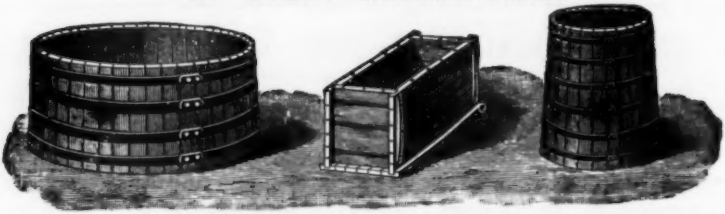

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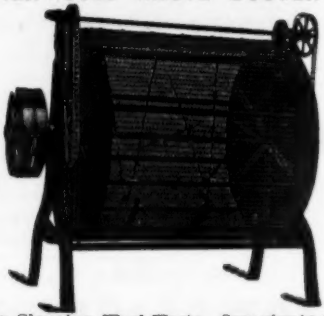

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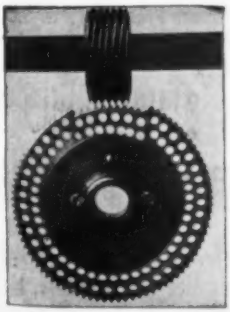

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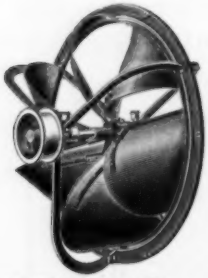

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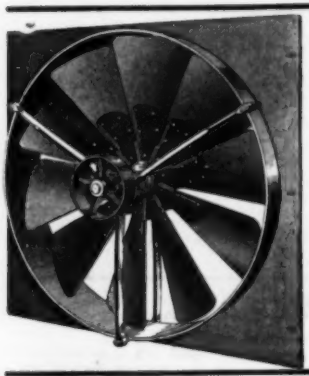

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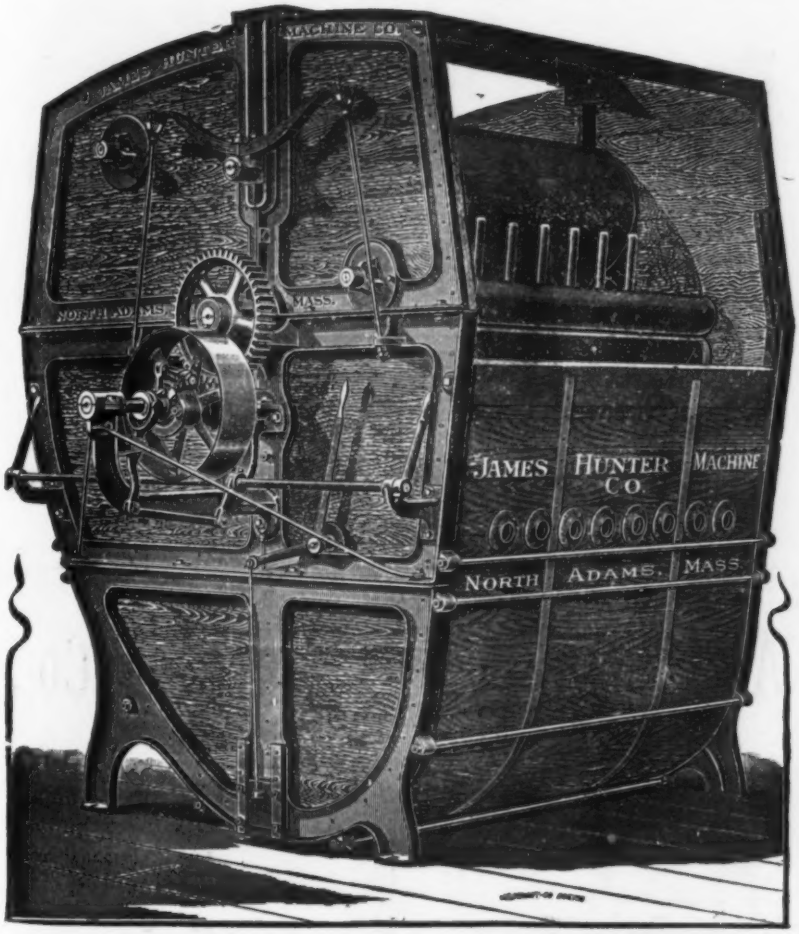

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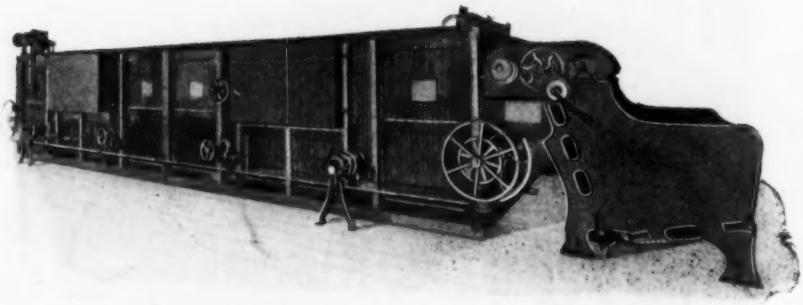

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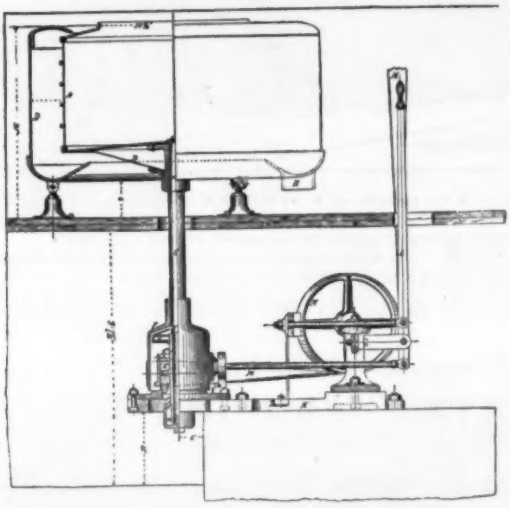

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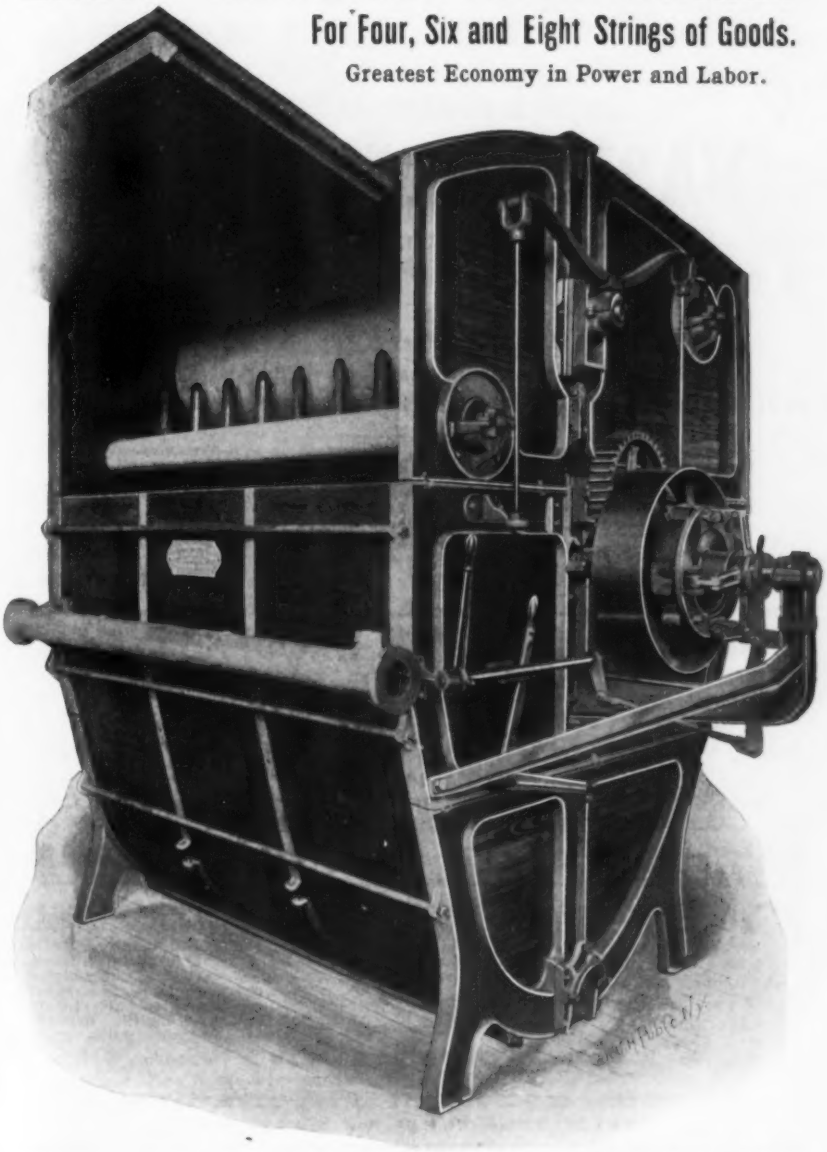

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I make Kettle Sticks, Dry and Sulphur House Poles, also Sticks to suit the Wolstenholm Machine from natural water grown Cedar. I also make Sticks to suit the Klauder, Weldon, and Lorimer machines, singed or plain, with or without copper ferules. Square and flat Drying, Bleaching and Sulphur poles from finer grades of lumber. Poles for rolling rugs on, etc.

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NO. 3

NAPPER

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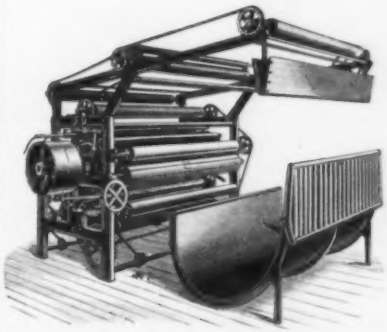

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Parks & Woolson

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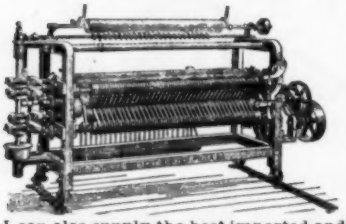

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I can also supply the best imported and domestic perforated and corrugated aprons for any rub motion.

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The attention of Woolen Manufacturers is invited to these Machines as convenient labor-saving appliances. The machine can be adjusted to make any size balls to suit lots, and the creel is constructed to carry twice the number of spools used by the old system Send for circular.

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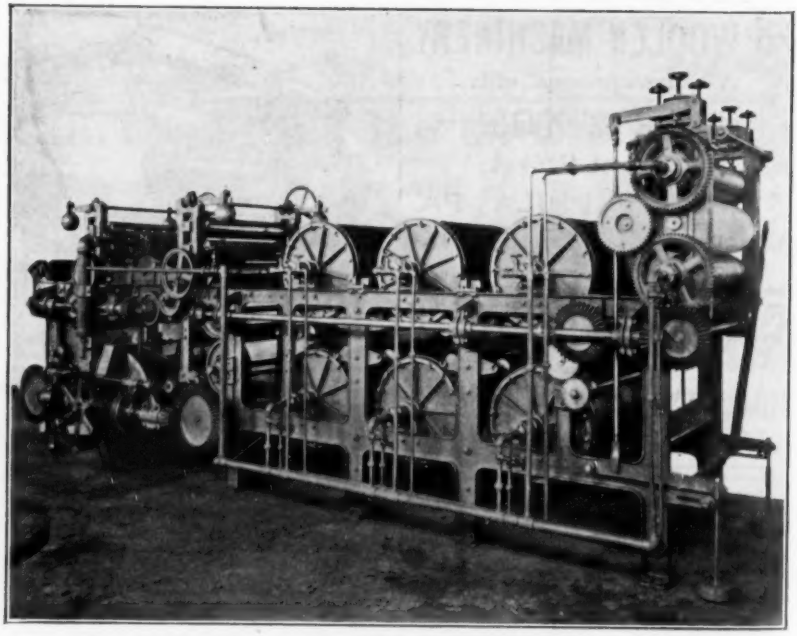

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GARTERS, SUSPENDERS, ETC.

Shrinks and sizes the goods on both sides. Send for full particulars and prices to

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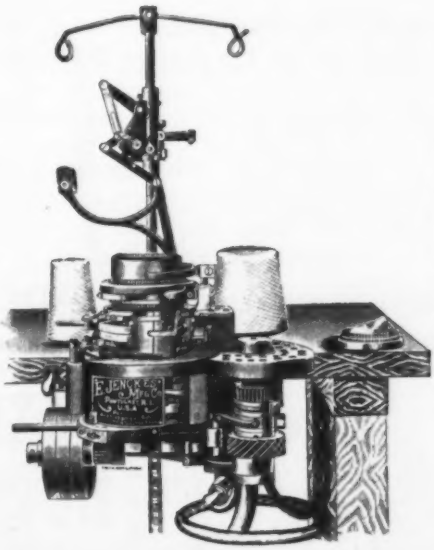
THE INVINCIBLE

FULL AUTOMATIC KNITTING MACHINE

IS ADAPTED TO THE ECONOMICAL PRODUCTION OF ALL CLASSES OF SEAMLESS HOSIERY.

It is the only full automatic machine made to be fastened to a bench, occupying no more space than semi-automatic machines.



It has a simple and positive attachmen for putting in and taking out an extra thread in heel and toe automatically.

A simple and positive attachment can be applied for **making high spliced heels and double soles automatically,** at the same time the heel and toe are reinforced by an extra thread. The splicing arrangement is supplied with yarn from a bobbin holding a quantity of yarn, and not from a small cop such as is usually used in devices of this kind.

The only successful yarn changer is applied to this machine. This device changes the yarn automatically at heel and toe, or at any desired point in the knitting of the stocking. It does not require a revolving bobbin which is commonly used in similar devices, but allows the use of a full size winder bobbin or cone for each yarn used. It is perfectly positive in its operation, is imple and well built, and is recommended as filling a popular demand.

In knitting "string work," **a loose course** is put in as a guide for cutting off each stocking. **A loose course can be be put in for looping** the toes. This is a great advantage in fine gauges.

Attention is invited to the new method of transferring tops to the needles of machine in knitting Half Hose, and in footing ribbed leg hose.

The method of doing this is entirely new, and must not be confounded with the ordinary method of transferring with a quill ring.

The speed of the machine is reduced just before changing from circular to reciprocatory knitting, thus avoiding all shock. All parts are interchangeable.

By changing cylinders only, the machine will make either fine or coarse gauge of goods.

The Invincible is a compact, light running, full automatic machine, simple in construction, has few parts, runs at high speed, occupies small space, and is put upon the market at a price that defies competition from either full or semi-automatic machines.

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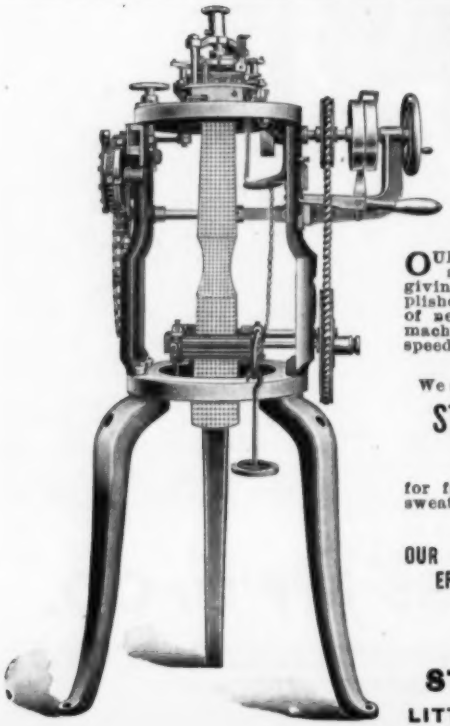

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OUR MACHINERY ENABLES MANUFACTURERS TO "LEAD THE PROCESSION" INSTEAD OF STUMBLING ALONG WITH THE CROWD.

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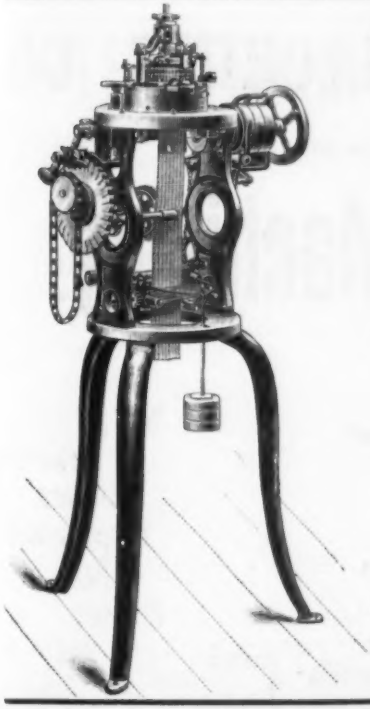

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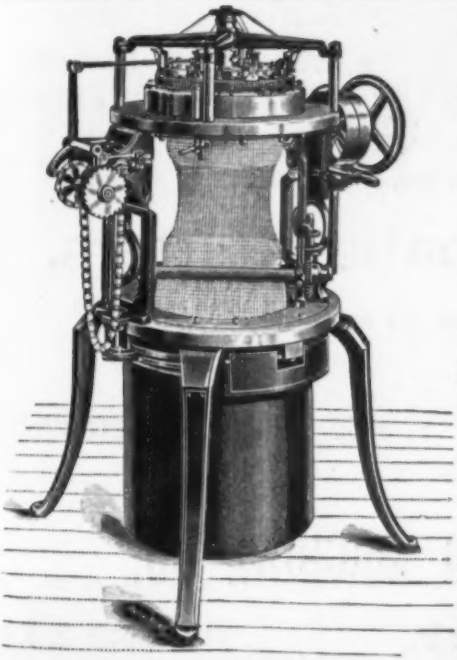
Single Feed Automatic Ribber

With Welt and Slack Course for Half Hose Tops and Rib Legs, Etc.



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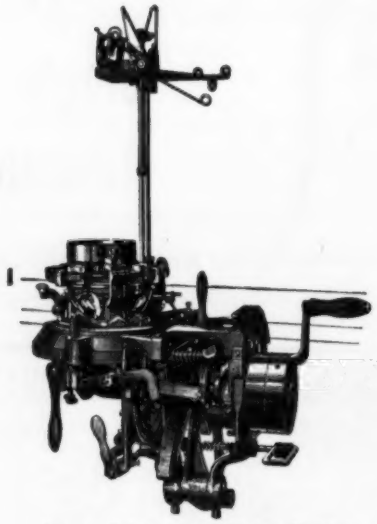

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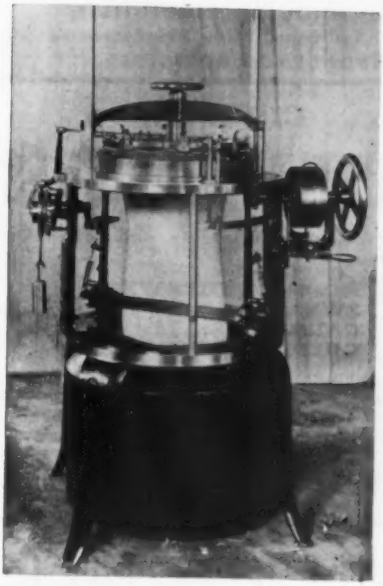

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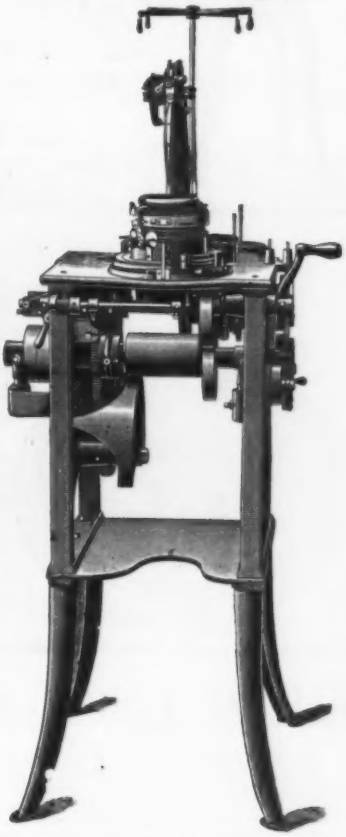

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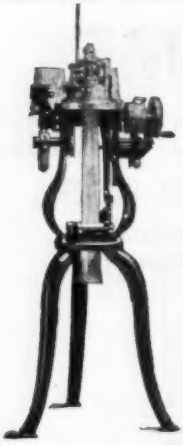

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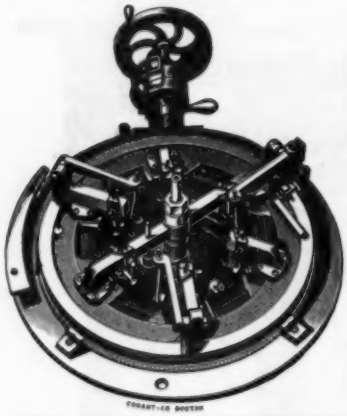

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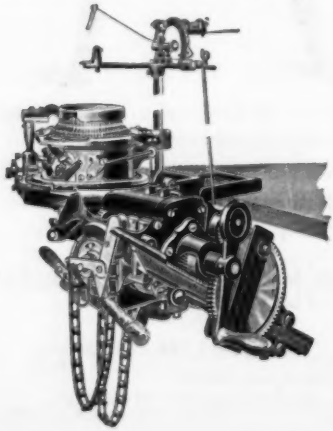

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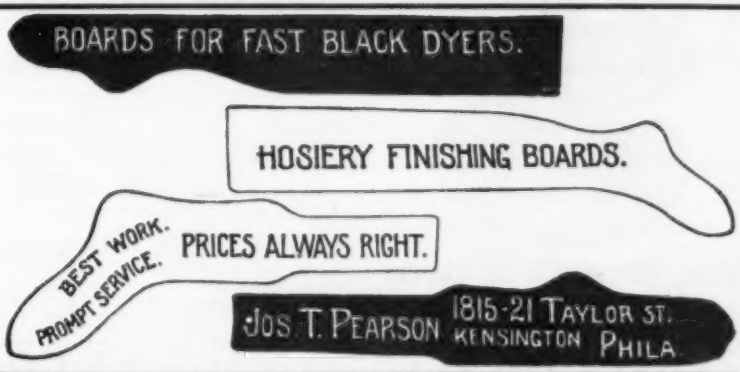

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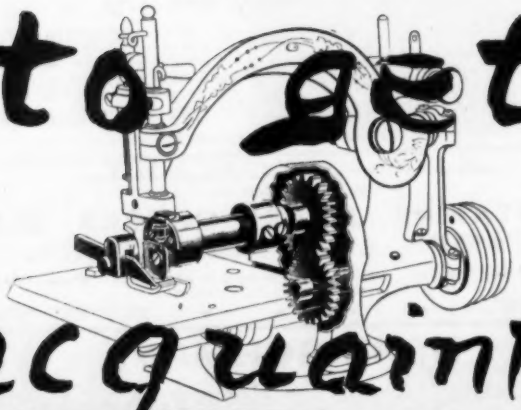
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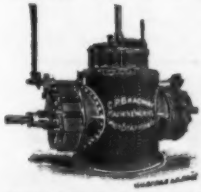

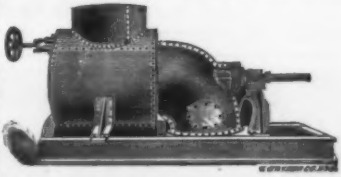

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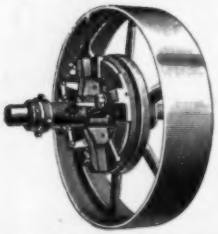

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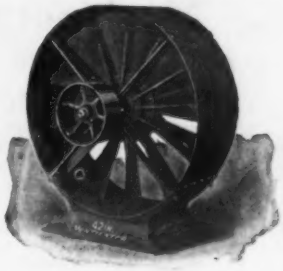

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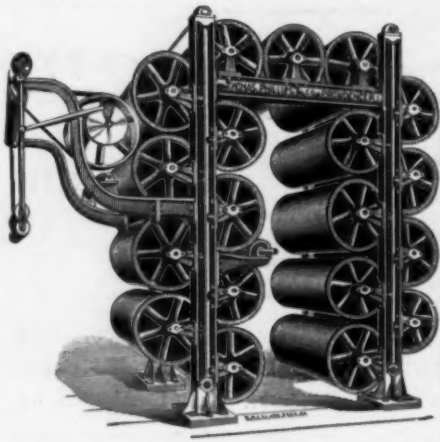

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